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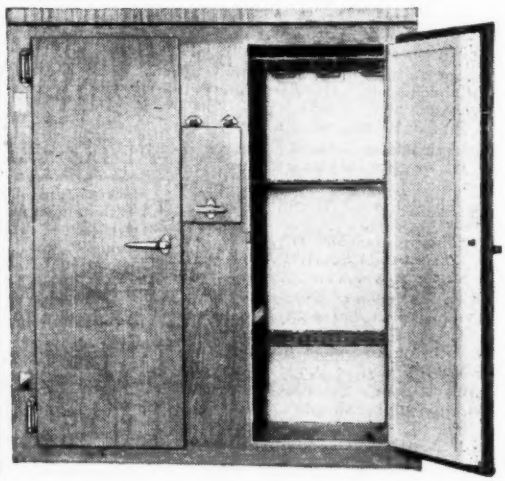

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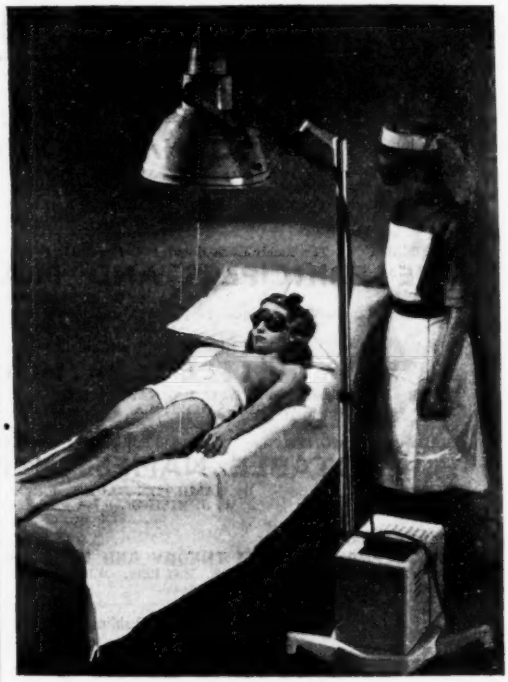

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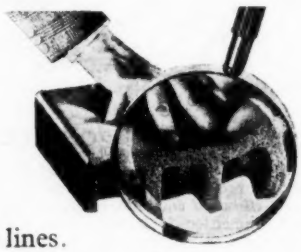

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British Medical Journal, June 30th, 1945, p. 926.

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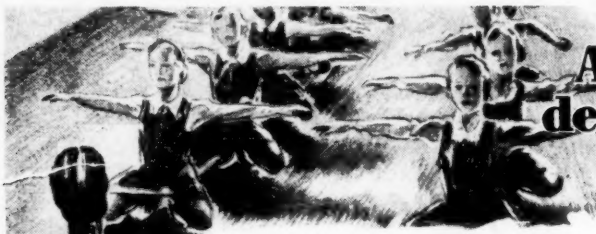

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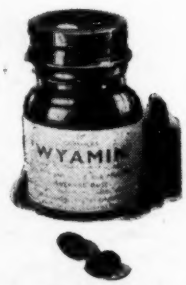

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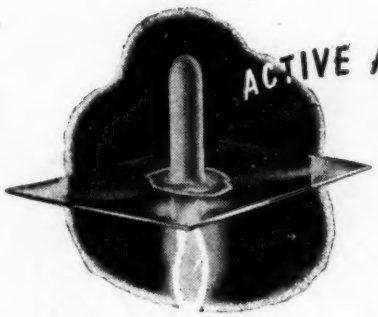

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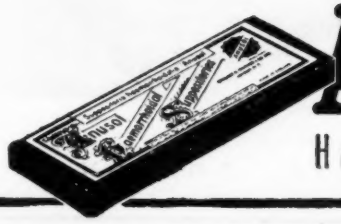

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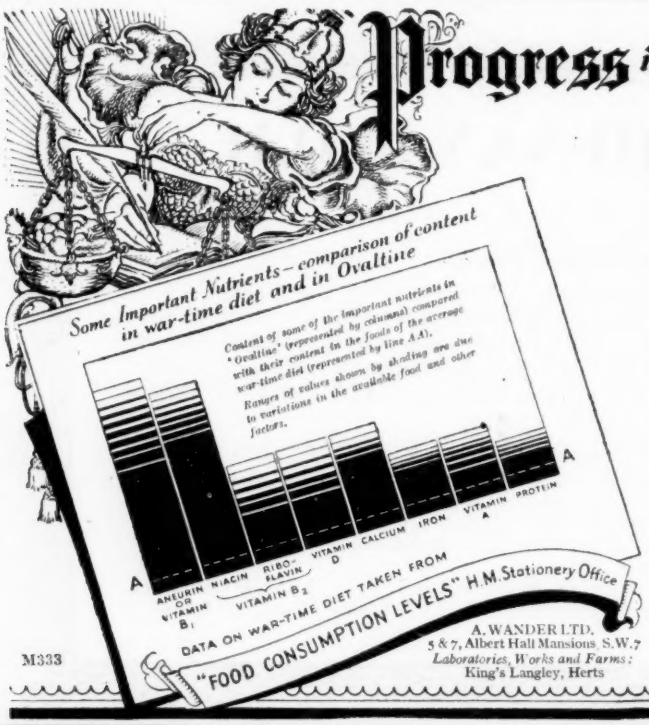
Some Important Nutrients—comparison of content in war-time diet and in Ovaltine
Content of some of the important nutrients in 'Ovaltine' (represented by columns) compared with their content in the foods of the average war-time diet (represented by line A.A).
Ranges of values shown by shading are due to variations in the available food and other factors.
A
ANEURIN OR VITAMIN B1
NIACIN
RIBO-FLAVIN
VITAMIN B2
VITAMIN D
CALCIUM
IRON
VITAMIN A
PROTEIN
A
DATA ON WAR-TIME DIET TAKEN FROM "FOOD CONSUMPTION LEVELS" H.M. Stationery Office

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THE end of the war provides a fitting opportunity to describe progress in nutrition resulting from the efforts of British scientists to overcome war-time difficulties. In the previous statements in this series we have shown the results of the efforts made to maintain and improve the food value of the national diet. Data have been given illustrating changes in supplies of staple foods during 1939–44 and the efforts that were made to obtain as much dairy produce as possible. During these years there has been a steady improvement in the supplies of body-building and energy-providing factors.

In this fourth statement we think it may be of interest to compare 'Ovaltine' with the foods in the average war-time diet for its content of some of these important nutrients. The diagram shows that, weight for weight, 'Ovaltine' has contained these nutrients in proportions ranging from 3 to 12 times those found in the food of the average diet.

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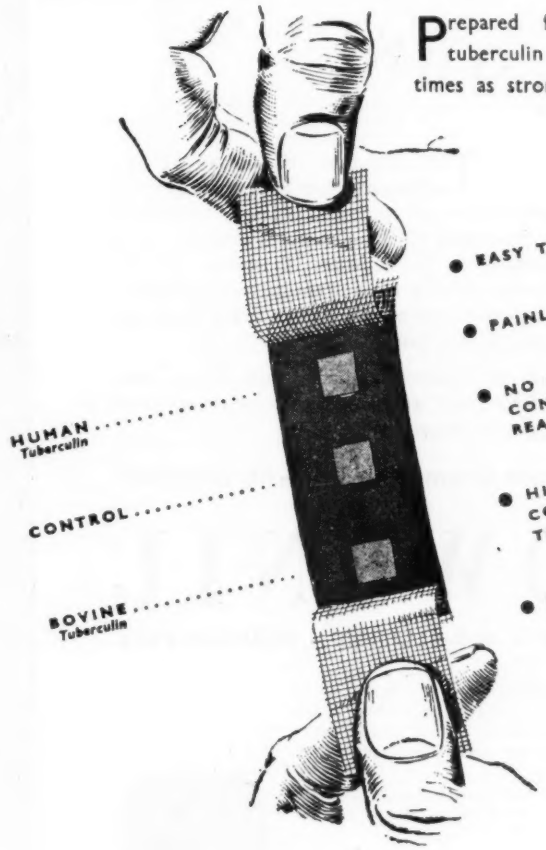

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R. A. McCANCE
M.D., Ph.D. Camb., F.R.C.P.
PROFESSOR OF EXPERIMENTAL MEDICINE IN THE UNIVERSITY OF CAMBRIDGE

EXCEPT for a few isolated people, such as the Eskimos and the Masai, who are almost entirely carnivorous, man relies largely on cereals to furnish himself and his domestic animals with food. Climatic and economic conditions largely determine whether wheat, rice, maize, oats, barley, rye, or millet shall be grown, but precedent and practice are also important factors, especially in primitive and semi-primitive agricultural communities such as those of India and Africa. Before the recent war wheat and maize were produced in roughly equal amounts, and smaller but still enormous quantities of rice, oats, rye, and barley were harvested. All of them can be ground into flour and made into palatable cakes or porridge, but wheat is the only one which will bake good bread.

"Wheat is the farinaceous food most generally used by the better sort of people over the whole of Europe, excepting the very northern parts in which it cannot be produced; but even there it is imported for the use of persons of condition. It has this advantage, that it can be formed into a more perfect kind of bread than any other of the Cerealia . . ." (Cullen 1789). The reason for this is that the proteins of wheat have special physico-chemical properties. Because of these the flour can be made into an elastic dough which entangles the bubbles of gas liberated by the yeast or raising agent and produces a porous, firm, and upstanding loaf. Hence wheat has become the cereal of choice for bread-making and human nutrition. It will grow in temperate climates in most parts of the world. It was cultivated in Egypt in Pharaoh's time and is harvested now extensively in the United States, Canada, Argentine, Australia, Europe, Russia, Egypt, and parts of India.

The fact that wheat bakes the best bread does not necessarily mean that it contains more nutrients than any of the other cereals. Each has its own characteristics and uses. Oats, for example, contain more fat than any of the other grains and have a high proportion of protein. They are a good cereal nutritionally, but they have a greater tendency than the other cereals to produce rickets. They are eaten as porridge and oatcakes in this country, but the bulk of the oatmeal produced here at home goes to feed the animals. Barley is the cereal of choice for the brewing industry and is also used extensively in animal nutrition. Rye will grow on very poor soils, and the bread made from it is eaten extensively in Denmark, Germany, Scandinavia, and parts of Russia. Maize is the staple cereal for human consumption in parts of the Southern States of America, Africa, and Europe. It is used in the manufacture of some of the native beers. It is a poor cereal nutritionally, and its geographical distribution is associated with that of endemic pellagra. It is, however, a valuable animal food and probably the cheapest of all cereals to produce. Rice is the great cereal of the East for human consumption, but it is also used in Japan for brewing, and the milling by-products are valuable animal foods (Kent-Jones 1939).

STRUCTURE AND COMPOSITION OF WHEAT GRAIN

Botanically the wheat grain is a seed, and it has an elaborate structural and chemical organisation adapting it for the work of reproducing its kind. Fig. 1 shows its structure diagrammatically. Starting from the outside there are several layers of hardened covering cells, and underlying them the aleurone layer, which is a highly specialised envelope of cells rich in protein. Then comes the endosperm, which for structural, chemical, and milling purposes must be divided into the outer and the inner endosperm. The "germ" is situated at one end of the seed and is a tiny structure, divisible, however, into the scutellum and the embryo, which are functionally and chemically quite distinct. The scutellum separates the embryo proper from the main mass of the seed, the whole of which breaks down on germination to furnish the embryo with the material it requires for its early growth.

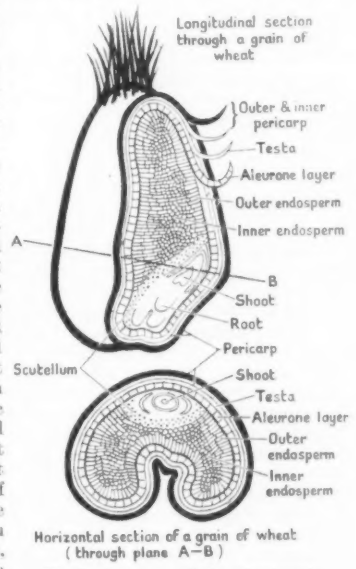

Fig. 1.—Structure of the wheat grain.

These separate parts of the grain have not all been subjected to a complete chemical analysis, but table I shows some of the facts which have been compiled about them, and table II the amount which each of them contributes to the weight of the total grain.† A glance at table I shows that the inner parts of the endosperm are much poorer in protein, minerals, and vitamins than are the outer layers. The amounts of phosphorus and aneurine (vitamin B_1) in the scutellum are really remarkable. One cannot help wondering whether these substances are not metabolically as well as anatomically associated; the variable proportions of inorganic and phytic-acid phosphorus in the different parts of the grain are a challenge to the experimental ability of the plant physiologists (McCance and Widdowson 1945).

THE BAKERS AND THE PUBLIC

The public, who eat the bread, demand certain characteristics in the loaves they buy. They prefer them white rather than brown, and they like them to have a big volume and uniform texture, to cut and to keep well. The bakers from long experience know the kind of flour which will bake such loaves. It has what they call "strength." By this each baker really means a flour which will give a fine big loaf by the process he happens to use for preparing the dough. Exactly what is meant by this term scientifically it would be very difficult to say (Kent-Jones 1939), but certain facts are known and recognised on every hand. Some wheats, for example, give a much stronger flour than others, and in general the higher the protein the greater the strength. Canadian-grown wheat, which may contain 14% of protein, gives a characteristically strong flour, English wheat with 8–10% of protein in it a characteristically weak one. The difference is due more to climatic conditions than to anything else, but the species of wheat is also a factor. "Yeoman" wheat, for example, is stronger than most other English varieties. Wheats grown in other parts of the world tend to have intermediate qualities.

For obvious economic reasons most of the wheat-

* Finlayson Memorial Lecture, delivered to the Royal Faculty of Physicians and Surgeons of Glasgow, Jan. 9, 1946.

† Much of this fine chemical work and other information about the newer aspects of milling has come from the Cereals Research Station, St. Albans.

TABLE I—COMPOSITION OF THE WHOLE-WHEAT GRAIN, THE ENDOSPERM, AND THE GERM

Component	Whole wheat	Endosperm		Germ	
		Central portions	Outer layers	Embryo	Scutellum
Protein (%)	8·9	8·1	14·6	33	29
Fat (%)	2·2	0·7	..	15	30
Carbohydrate (%) ..	66·8	75·8	..	..	..
Phosphorus (mg. per 100 g.)	311	59	1017	1160	1900
Phytate phosphorus (mg. per 100 g.)	213	8	874	400	1300
Iron (mg. per 100 g.) ..	3·0	0·5	12	9	..
Vitamin B_1 (I.U. per g.)	1·6	0·1	1·8	3	60
Riboflavine (g. per g.) ..	1·5	0·4	1·8	15	..
Nicotinic acid (g. per g.)	42	5	184	60	..

producing countries have to eat their own wheat, and this to some extent dictates the type of bread and farinaceous articles they will produce (Irons 1936). Macaroni, for example, is almost the national emblem of Italy, although "Durum" wheat, from which it is made, is now grown extensively in America. We also must consume our own wheat, but we do not produce nearly enough for our own requirements, and hence we must import enormous quantities. This enables us to select from the world wheats those most suited for our purposes and our palates and to blend wheats to meet every demand. Thus most of the Canadian wheat we import goes into bread, and much of the weak English wheat is used in the biscuit trade, for which it is eminently suitable.

It is the endosperm which imparts strength to the flour, and a mixture of bran and germ weakens the flour for baking purposes. It is almost impossible to get brown flour to rise and set so well as white flour made from the same wheat. Thus both appearance and baking qualities have led bakers from time immemorial to remove as much of the bran as possible from the ground grain. The Romans had four or five grades of flour, and the most expensive contained the least bran, and there are many references in the Bible to fine flour: ("And thou shalt take fine flour, and bake twelve cakes thereof; . . ." *Leviticus*, xxiv, 5). The classical method of effecting this separation was by hand sieving ("I will sift the house of Israel among all nations, like as corn is sifted in a sieve, . . ." *Amos*, ix, 9). This technique for removing the coarse particles of bran continued

TABLE II—COMPONENT PARTS OF THE WHEAT GRAIN AS PERCENTAGES OF THE WHOLE

Component part		Percentage by weight of whole wheat
Bran	lignified outer layers ..	4·0
	aleurone layer	8·3
Endosperm	excluding outer layers	83·0
	outer layers	2·0
Germ	embryo	1·2
	scutellum	1·5
Total		100·0

almost unchanged for many centuries, but nowadays the whole process has become part of the milling industry and is carried out at the big roller mills.

For reasons which we do not yet understand weakness in flour is accentuated by the presence of reducing substances. These may be –SH groupings in the flour proteins (Jacquot and Guillemet 1944, Bailey 1944). At all events, adding cystein to a strong flour converts it instantaneously into a very weak one. If flour is left in contact with air, these reducing groups are slowly oxidised, and the flour becomes stronger. The process can be greatly accelerated by oxidising agents, and these are the basis of the "improvers" which the millers use and to which some nutritional experts have taken so much exception.

THE MILLERS' POINT OF VIEW

In the primitive communities the miller and the baker were no doubt one and the same person, and "milling" consisted in pounding or grinding the grain, as it does still in many parts of the world. But when first water and then wind were harnessed to turn the millstones, the era of specialisation had begun. The fundamental changes in the milling processes, however, took place with the introduction of roller mills in the 19th century. With a roller mill at his command the miller could separate the endosperm pretty well completely from the outer coats, aleurone layer, and bran. This pleased the bakers and the public, and the millers were very glad to please them, because the requirements of the country were the same whether the public were given a white flour representing 70% of the original grain, or wholemeal flour. According to the millers, indeed, people eat more white flour than brown. But to supply white flour, even in equal quantities, meant a larger turnover of wheat at the mill and provided by-products which

TABLE III—COMPOSITION OF ENGLISH AND MANITOBA WHEATS AND OF FLOURS MILLED FROM THEM

	(g./100 g.)				(mg./100 g.)			(μg./g.)	
	Protein	Fat	Carbohydrate	Fibre	K	Ca	Fe	Riboflavine	Nicotinic acid
Whole wheat Manitoba ..	13·62	2·49	63·0	2·15	312	27·6	3·81	1·7	55·0
English	8·89	2·23	66·8	2·08	361	35·5	3·05	1·7	48·0
Flour—85% extraction (English)	8·55	1·46	72·0	0·42	179	24·5	2·22	1·2	10·5
80%	8·21	1·28	73·5	0·19	151	21·5	1·65	0·8	9·0
75%	7·98	1·13	74·2	0·15	118	19·2	1·35	0·6	8·0
70%	7·92	1·04	74·5	tr.	111	18·9	1·40	0·6	7·5
46%	7·64	0·76	75·8	tr.	99	15·2	0·95	0·5	5·0

The milling behaviour of the Manitoba wheat is so similar to that of the English (see fig. 2), that the details of it have been omitted. Full details will be found in the original publication (McCance, R. A., Widdowson, E. M., Moran, T., Pringle, W. J. S., Macrae, T. F. *Biochem. J.* 1945, **39**, 213.)

the miller was able to dispose of at remunerative prices to the animal husbandmen. Economically, everything was set fair and remained so until physiologists and shipping shortages began to intervene.

NUTRITIONAL VALUE OF WHEAT AND WHEAT FLOURS

The figures given in table I show that many substances of proven nutritional value are congregated in the outer endosperm and germ. Furthermore, bran, for which no figures are given in the table, seems to contain nearly as much nicotinic acid as does the outer endosperm (Moran 1945); and the aleurone layer, which separates with the bran, is said to contain 25% of protein and 9% of fat (Jacquot and Guillemet 1944). These facts provide clear chemical evidence of the nutritional value of the outer parts of the grain. Indeed, the inner endosperm looks poor stuff nutritionally, and its poverty is enhanced by the fact that its protein is known to contain an unbalanced and incomplete mixture of amino-acids.

Experience and experiments with animals fully bear out this chemical evidence. Breeders have always thought highly of the weatings or wheat offals and have been prepared to pay high prices for them as feeding-stuffs for cattle, poultry, and pigs. Many experiments have demonstrated their value as a source of vitamins,

and the mixed proteins of whole wheat have been shown to provide a much better growth mixture for rats than those of white flour (Chick 1942).

Table III shows what happens to the composition of flours as the extractions rates are lowered, and fig. 2 shows graphically the changes in some of the important constituents. These changes are due to the gradual removal of the bran, outer endosperm, and germ. By 85% extraction most of the bran (fibre) has gone, and this has led to the big fall in minerals, but most of the germ and scutellum have been retained, with some of the outer endosperm. This has prevented any serious fall in aneurine and has held up the concentration of iron and other vitamins. A big fall in aneurine occurs as the extraction falls from 85% to 75%, because it is between these two extractions that the germ and scutellum are removed. In spite of the high concentrations of protein in the germ, aleurone layer, and outer endosperm, these constitute a relatively small proportion of the total grain; hence the 70% flour contains little less protein than whole wheat. Nutritionally, however, the quality is much lower. It should be noted in passing that there is very little calcium in wheat.

TABLE IV—NITROGEN ABSORBED PER 100 G. OF NITROGEN EATEN

Extraction-rate of flour	As English wheat containing 8·32% protein	As Manitoba wheat containing 13·51% protein
80%	83·4	90·9
90%	80·0	87·2

Bran is laxative and stimulates the intestinal glands to produce more secretions. It has been recognised for many years that bran in small quantities is partially digested, but that tolerance varies (Brull et al. 1945). Its inclusion in the flour used for baking lowers the utilisable calories of the bread, so that raising the extraction-rate indefinitely is not all pure gain. Fig. 3 shows this and that up to 85% the rate of utilisation does not fall off much. The big fall takes place between 85% and 100%.

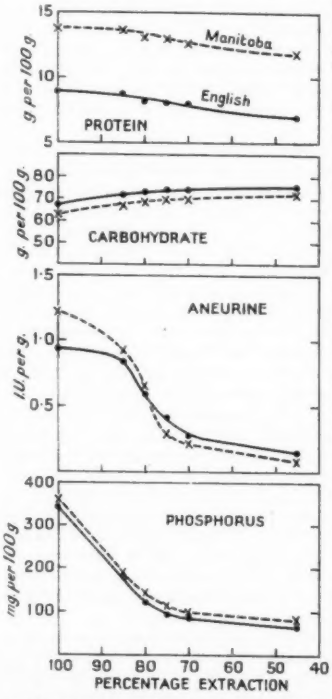

Fig 2—Effect of milling on the composition of wheat: Manitoba and English flour compared.

Many people have found that increasing the extraction-rate lowers the apparent digestibility of wheat protein. We have recently confirmed this once more (table IV) but we have added further information. First, the apparent digestibility of wheat protein rises with the amount of protein in the wheat. Secondly, with extraction-rates up to 90% practically all the protein in the fæces is derived from the intestinal glands and not from the wheat. This is indicated by table V, which shows that the nitrogen excreted in the fæces depends on the amount of flour eaten and the extraction-rate of that flour but not on the amount of nitrogen in it. If any of the wheat nitrogen was undigested and unabsorbed, one would expect to find that increasing the amount of nitrogen eaten increased the amount excreted. Hence a moderate increase in the amount of bran in the bread lowers the apparent digestibility of wheat proteins by increasing the intestinal secretions rather than by the addition of indigestible protein. Similar experiments with whole-meal flour have still to be carried out and may show that the additional bran causes so much more intestinal hurry that its protein is not all digested. These results with wheat, moreover, must not be taken necessarily to apply to other cereals, for the addition of the outer parts of their grains to their refined flours decreases the apparent digestibility of their calories and protein much more than similar additions of wheat bran (Jacquot and Guillemet 1944).

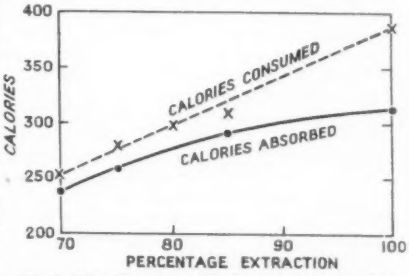

Fig. 3—Calorific value of the flour consumed and of the parts of it available for physiological purposes per 100 g. of wheat milled.

It was found in the early years of the recent war that there was one nutritional disadvantage about raising the extraction-rate. It leads to the inclusion of more and more phytic acid in the flour. This substance, inositolhexaphosphoric acid, precipitates calcium in the intestine and by so doing prevents its absorption (McCance and Widdowson 1942, Hoff-Jørgensen 1944). The effects might be much greater were it not for the fact that the flours also contain an enzyme, phytase, which hydrolyses the phytic acid during the making and raising of the dough (Widdowson 1941, Pringle and Moran 1942). Oatmeal contains very little of this enzyme (McCance and Widdowson 1944, Schulerud 1944), and it is thought that this is why it is so much more rachitogenic than wheat or rye (Mellanby 1925). The presence of phytic acid in the outer parts of the grain might have been a serious argument against raising the extraction-rate, had the people who made this discovery not also shown that the bad effects of phytic acid could be entirely prevented by adding calcium to the bread (McCance and Widdowson 1942).

TABLE V—NITROGEN IN THE FOOD AND IN THE FÆCES PER 1000 G. OF FLOUR EATEN

	Nitrogen in—	
	food (g.)	fæces (g.)
As Manitoba 90% extraction	126	1·73
As English 90% extraction ..	84	1·68
As Manitoba 80% extraction ..	130	1·19
As English 80% extraction ..	82	1·36

Since the war ended, contact has been re-established with the Danish scientists, and it appears that they have also been working on this subject during the past few years. A commission was appointed to go into the matter, and Dr. E. Hoff-Jørgensen was placed in charge of a great part of the work. Our results have been confirmed at all points, and the Danes have reached conclusions which in many cases are identical with ours, but they have gone a little farther in two respects. They have found that

lactic acid specifically catalyses the enzyme phytase, and they have considered making use of this accelerating effect to remove the phytic acid from rye breads. They have also carried out balance experiments with children (in this country the work was all done on adults), and they have shown that phytic acid has a most deleterious effect on their calcium absorptions. This is a most valuable extension of th work carried out in this country (Lundsgaard, personal communication).

EFFECT OF THE WAR

A shortage of shipping in the 1914–18 war forced the Government to take control and to introduce brown bread for general use. About 92% of the grain of wheat went into the flour in 1917–18, and only the coarsest particles of bran were excluded. Potato starch and other cereals were added from time to time, and the product was the cause of a good deal of discontent. It was obvious in 1939 that there was likely to be a shortage of shipping before very long, and in an experimental study of rationing which we carried out at that time we assumed that such would be the case, and we provided the experimental party with bread made from wheat flour of 92% extraction (McCance and Widdowson 1946). We did not spoil this good flour by adding other cereals, but we did add precipitated chalk. This was done because our rations of milk and cheese were so small that we might have suffered from a deficiency of calcium. We did not appreciate at that time the important part that the phytic acid in the brown bread might play in our calcium metabolism. We only found this out later, but it was this experiment which gave us our clue, for the calcium absorptions from our experimental rations were unexpectedly and unexplainedly low.

As the war went on, the shortage of shipping made it necessary to reduce imports very drastically. More English wheat was grown, but by 1940–41 it was clear that the extraction-rate would have to be raised, as it had been in the last war. The only question was to what extent it should be raised. Much depended on a wise decision. There were several points of view to be considered and reconciled. The public and the bakers wanted the whitest loaf possible for the reasons already given, and the need for including more and more English wheat in the grists made their request a reasonable one. The physiologists were convinced and had been for many years that raising the extraction-rate would improve the nation's health, but they were uncertain to what extent the inclusion of bran would be beneficial. The animal breeders were in desperation for feeding-stuffs ; and unless the nation was in extremis it seemed reasonable to reserve the coarsest parts of the bran for animals, which make much better use of this foodstuff than does man.

Considerations such as these led the Accessory Food Factors Committee of the Lister Institute and the Medical Research Council to recommend the Government to adopt an 85% flour and to fortify it with calcium (Medical Research Council 1941). It was felt that such an extraction was an immense nutritional improvement on the old 70% loaf, that the nation was assured of its B vitamins, a good protein mixture, and additional iron, and that the risk of a calcium deficiency had been foreseen and steps taken to prevent it. The Government, faced by the shipping situation, accepted the 85% recommendation, halved the suggested amount of calcium, introduced the National Loaf, and popularised it by making the most of its nutritional advantages. A sense of responsibility for the nation's health was rapidly developing at that time, but it is a reflection on democratic methods of government that it should have required a shortage of shipping and a crisis like that of 1940–42 to effect what must be regarded as a major nutritional reform.

There can be no question that this loaf was the right thing at the right time, and the benefits attributed to it may be taken as a measure of its success. Thus, the reduction in anæmia which has been detected in Edinburgh has been held to be due to the iron which it introduced to " everyman's " food ; the reduction in the sale of laxatives to its residual traces of bran ; its success in invalid nutrition, particularly in ulcerative conditions of the gastro-intestinal tract, to the fact that so much bran had been eliminated ! The last two of these claims have always seemed to me somewhat contradictory, and I have never felt very happy about the first. I had anticipated that the phytic acid in the 85% flour would counterbalance the additional iron by precipitating it in the intestine (Widdowson and McCance 1942, McCance et al. 1943). Nevertheless I am convinced that the public owes some of their good health during a very trying time to the bread with which they were provided.

RECENT DEVELOPMENTS

Towards the end of 1944 the Government suddenly announced that it proposed to reduce the extraction-rate for wheat to 82½% and shortly afterwards to 80%. This move, which seemed to many to have been made at a most inopportune moment, revealed an unstable policy on the part of the Government and aroused a feeling of insecurity among the people who were anxious to see national health come first. A debate was held in the House of Lords on the subject on Feb. 28, 1945. Many of the speakers made mistakes about their facts, but the Government found it difficult to justify its actions. A second debate was introduced by Lord Hankey on Oct. 24, 1945 (*Hansard* 1945). He moved " That the health of the population should be the guiding principle to govern the nutritional policy of the Government, and that in applying that principle to the case of bread the health of the consumer should be the primary factor, and milling and other interests should be developed in harmony with this policy " ; and the motion was accepted. In this debate some of the conclusions of a conference which had been convened by the Government on the post-war loaf were revealed by Lord Horder and Lord Llewellin (*Hansard* 1945), and the report of this conference has now been published (Ministry of Food 1945).

It appears to have been recognised that flour must in future conform to certain nutritional standards, and it is implied that these shall be of the order of those contained in flours of 80–85% extraction. I have discussed the nutrient value of flours of various extractions and shown how these tend to fall as the extraction is lowered ; hence it might be supposed that this step would be equivalent to fixing the extraction-rate at an optimal nutritional level. But this is not quite the case. The bakers are still, I have no doubt, pressing for a white loaf and urging the millers to supply them with one. When the extraction-rate was 85%, the millers had no option but to extract every possible particle of flour and germ from the wheat. The nutritional value of the flour was assured. But with the fall to 80% the miller has two alternatives. In spite of the Government controls, which entail an elaborate system of weighing, he may mill to give a flour of optimal nutritional value or he may mill to give a flour more pleasing to his customer, the baker. The millers must make their living, and if they do not do their best to please their bakers they can see these same bakers buying low-extraction flour in America and Canada as soon as the restrictions are removed and dispensing with their services altogether.

The millers would like to be allowed to mill to low extraction as they did before the war and to add minerals and synthetic vitamins to the flour to bring it up to specification. This is now the practice in America, so there is precedent for it ; it would pander to popular taste, and would have a sense of cleverness and mastery

about it which would have a cheap newspaper appeal. A surprising reason for permitting the addition of synthetic vitamins was brought out by the conference on the post-war loaf (Ministry of Food 1945). It seems that the members of the technical subcommittee knew of no simple yet infallible test by which the extraction-rate of flour could be measured, and thereby enforced, after the present Government control was allowed to lapse. It was felt, therefore, that it would be useless to try to insist that the "token" nutrients, such as iron and aneurine, in the flour should come from the wheat itself and not from the chemist's laboratory. This seems very strange, for, although it might be very difficult to distinguish between natural and synthetic vitamins once they had been added to flour, it should surely not be beyond the wit of man to devise a test by which the extraction of flour could be judged with sufficient accuracy to ensure that any given sample was of 83–86% extraction.

Everything that we know about biology and nutrition is opposed to the practice of artificial enrichment, for man can only put back what he knows he has taken out. He would be a very bold miller who offered to replace all the valuable amino-acids, minerals, and vitamins in the outer parts of a grain of wheat. "It must be recognised that synthetic vitamins and vitamin concentrates are expedients that cannot form the basis for a sound nutrition programme. In the last analysis, good nutrition must be built upon a foundation of an optimum diet of natural foodstuffs" (Boudreau 1945).

WHAT'S TO DO ABOUT IT?

The increase in our knowledge of nutrition, coupled with the growing sense of responsibility which Governments feel in matters of public health, is bringing this problem to the fore in many countries. As already mentioned, the Americans have chosen to fortify 70% flour with minerals and vitamins; the Canadians have forbidden enrichment and are pushing "Canada approved" flour, which is about 78% extraction and rich in aneurine; the Dutch, I hear, have not yet decided between the rival claims of high extraction and fortification, and I do not know yet what is being done in other countries.

If the health of the people really is the first consideration in our bread policy, the cheapest, safest, and easiest way to maintain this is to keep up the extraction-rate of the flour used for bread-making. Speaking personally—i.e., nutritionally—I would like to see 85% flour and the "National" loaf reintroduced. The nutritional case for such action has been admirably put by Lepkovsky (1944), whose article contains also a reasoned and informative review of the whole of the so-called bread "problem." If this were done as a long-term policy, milling techniques would be improved and adapted in conformity, and this would lead to a betterment in the 85% flours. Calcium should be added to neutralise the bad effects of phytic acid.

I recognise that there are difficulties about 85% flour. One is its keeping qualities, which are not so good as those of 70% flour. Lord Llewellin made this point in the debate in the House of Lords. Now there are, I believe, two aspects of this. One is that the 85% flour goes "off" on keeping because the fat in the germ becomes rancid. This may be a trouble in the Navy but should not be so in civilian practice in this country. Another is that the baked loaves go mouldy quicker than loaves made from 70% flour. This may be a matter of the moisture content, but it may well be a sign of nutritional quality, for these moulds are very discriminating little creatures and will only grow on the very best media. They much prefer, therefore, an 85% to an 80% or 70% loaf.

The millers will always be in a difficulty with long-extraction flours, so long as the public has a free choice of loaf and remains more interested in football pools than positive health; but although I hate bureaucratic control I do not feel that these difficulties are insuperable. A good test for the extraction-rate of flour would be a help. Much could be done by frankly and honestly putting the case for its own health before the public. If we revert to a flour of 70% extraction, it will be much more difficult and much more expensive on purses and imports to ensure that Mr. Tom, Mrs. Dick, and Master Harry get their supplies of nutritional minutiæ, and I personally would not care to undertake to do it.

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SYNERGIC ACTION OF PENICILLIN AND SULPHATHIAZOLE ON BACTERIUM TYPHOSUM

JOSEPH W. BIGGER
M.D., Sc.D. Dubl., F.R.C.P., F.R.C.P.I.
PROFESSOR OF BACTERIOLOGY AND PREVENTIVE MEDICINE, UNIVERSITY OF DUBLIN

From the School of Pathology, Trinity College, Dublin

IT is generally considered that the typhoid bacillus is resistant both to penicillin and to sulphonamides, but since little precise information on the subject has been published it was considered worth while to investigate the effect of the two separately and in combination.

Eight strains of *Bacterium typhosum* were used: one of each of the phage types A, C, and G; two of each of the phage types E_1 and F_1; and one O strain devoid of Vi antigen. Both plain meat infusion broth and the same medium treated by the method of Harper and Cawston (1945) were used. Tests were made in tubes containing 5 c.cm. of plain or treated broth in which were incorporated the requisite amounts of sulphathiazole, of penicillin (Pfizer), or of both. Broths were inoculated by adding to a tube one loopful of a 24-hour broth culture or of a decimal dilution of it in broth. Since this is a rather inexact method of measurement, the number of typhoid bacilli stated to have been added must be regarded as a mere approximation.

The penicillinase used was that present in a Seitz-filtered 10-day broth culture of one of Harper's paracolon bacilli (Harper 1943).

EXPERIMENT 1

One strain of *Bact. typhosum* (phage type E_1) was inoculated into plain and treated broths with and without sulphathiazole (10 mg. per 100 c.cm.). The number of *Bact. typhosum* introduced varied between 700,000 and 7 per c.cm.

After incubation for 48 hours it was found that sulphathiazole, in the concentration used, somewhat reduced the turbidity produced in plain broth, but that definite turbidity was produced even when the inoculum was as low as 7 bacilli per c.cm. In treated broth containing 10 mg. of sulphathiazole per 100 c.cm. almost full turbidity was produced when the inoculum was 700,000 per

TABLE I—BROTHS AFTER 48 HOURS' INCUBATION
(Original number of bacilli added, 700,000 per c.cm.)

No.	Penicillin (units per c.cm.)	Sulphathiazole (mg. per 100 c.cm.)	Phage type of *Bact. typhosum*							
			A	C	E_1	E_1	F_1	F_1	G	O
1	8	0	+	+	+	+	+	+	+	+
2	4	0	+	+	+	++	+	++	+	+
3	2	0	+	++	++	+++	+	++	+	+
4	1	0	++	++	+++	+++	+	++	++	+
5	0	0	+++	+++	+++	+++	+++	+++	+++	+++
6	8	10	−	−	−	−	−	−	−	−
7	4	10	−	−	−	−	−	−	−	−
8	2	10	+	+	±	±	−	±	−	−
9	1	10	+	+	+	±	+	+	+	±
10	0	10	++	++	++	++	+	++	++	++

−, broth clear. ±, +, ++, +++, increasing degrees of turbidity.

c.cm., but greatly reduced turbidity was produced when the inoculum was 70,000 or 7000 per c.cm. When the inoculum was 700 per c.cm. or less the broth remained clear after incubation for 48 hours, although, as shown by subculture, the typhoid bacilli introduced were not killed.

EXPERIMENT 2

The eight strains of *Bact. typhosum* were tested in treated broth containing sulphathiazole (10 mg. per 100 c.cm.), penicillin (from 8 to 1 units per c.cm.) or both. The inoculum was approximately 700,000 bacilli per c.cm.

The results after 48 hours' incubation are given in table I. Inhibition of growth, as judged by the broths remaining clear, was not obtained with penicillin alone or sulphathiazole alone in the concentrations tested but was obtained by the combination of penicillin (8, 4, and in some cases 2 units per c.cm.) and sulphathiazole (10 mg. per 100 c.cm.).

To determine whether the bacilli present had been killed, the broths were incubated for a further 48 hours (96 hours in all). One loopful of each broth which had remained clear was then inoculated on an agar slope; this was incubated, and the broth tube, after the addition of a further 5 c.cm. of broth containing penicillinase and *p*-aminobenzoic acid, was incubated for five days.

The test imposed on the combination of penicillin and sulphathiazole—to attempt to kill 700,000 *Bact. typhosum* per c.cm. in 96 hours—was a severe one, but nevertheless it was found that, in broths containing 8 units of penicillin per c.cm. and 10 mg. of sulphathiazole per 100 c.cm., complete sterility had been attained with four strains and almost complete sterility (no growth from one loopful but growth from 5 c.cm.) with two strains, while with the remaining two strains the number of bacilli surviving was greatly reduced. Complete sterility was not produced with any strain by 4 units of penicillin per c.cm. and 10 mg. of sulphathiazole per 100 c.cm. although the number of surviving bacilli had been greatly reduced with several of them, as it also had in some cases by the combination of 2 units of penicillin per c.cm. and sulphathiazole.

The susceptibility of different strains of typhoid bacilli to the combination of penicillin and sulphathiazole varies, but the number of strains tested was too small to determine if their susceptibility depended on their phage type. The only strain devoid of Vi antigen showed about average susceptibility.

EXPERIMENT 3

Tubes of treated broth containing various combinations of penicillin and sulphathiazole were inoculated with decreasing numbers of typhoid bacilli (phage type F_1) and incubated for 48 hours, when the results shown in table II were obtained.

The broths were incubated for a further 48 hours (96 hours in all) when they were tested for the presence of living typhoid bacilli by inoculating one loopful on agar, and by further incubation after the addition of broth containing penicillinase and *p*-aminobenzoic acid.

Complete sterility was produced in 96 hours by 20 and 10 mg. of sulphathiazole per 100 c.cm. but not by 5 mg. acting alone on *Bact. typhosum* when the number of bacilli in the inoculum was 7 per c.cm. Sterility was not produced by sulphathiazole alone in any concentration tested when the number of *Bact. typhosum* was 70 or more per c.cm. Penicillin (4 units per c.cm.) in combination with sulphathiazole produced "one-loop sterility" but not complete sterility when acting on 700,000 *Bact. typhosum* per c.cm. The same combination sterilised 70,000 *Bact. typhosum* per c.cm., and as little as 1 unit

TABLE II—BROTHS AFTER 48 HOURS' INCUBATION

Sulphathiazole (mg. per 100 c.cm.)		20	10	5	10	10	10
Penicillin (units per c.cm.) ..	..	0	0	0	4	2	1
No. of *Bact. typhosum* originally present per c.cm.	700,000 ..	+	+	+	−	−	+
	70,000 ..	+	+	+	−	−	±
	7000 ..	±	±	±	−	−	−
	700 ..	−	−	−	−	−	−
	70 ..	−	−	−	−	−	−
	7 ..	−	−	−	−	−	−

− = Clear. ±, + = Increasing degrees of turbidity.

per c.cm. with sulphathiazole sterilised 7000 *Bact. typhosum* per c.cm.

It should be realised that penicillin deteriorates in broth at 37° C., and that the initial concentration mentioned in the experiments was not maintained for the whole period of 96 hours. A solution of penicillin in broth was kept at 37° C. for 45 hours, as a result of which its strength fell from 4 units to 2·5 units per c.cm.

DISCUSSION

The experiments recorded demonstrate that the combination of penicillin and sulphathiazole in a nutrient medium kills large numbers of typhoid bacilli. This further example of synergism of penicillin and a sulphonamide shows that sulphonamides differ from some bacteriostatic substances, such as boric acid (Bigger 1944) and helvolic acid (Chain and Duthie 1945), which interfere with the bactericidal action of penicillin.

The action of sulphathiazole on *Bact. typhosum* appears to be mainly bacteriostatic; only with very small numbers of bacilli could a bactericidal effect be demonstrated.

The object of this investigation was to discover if chemotherapy could be used in the treatment of typhoid fever. There is no reason to doubt that, by the simultaneous administration of the two drugs, typhoid bacilli would be killed in vivo as they are in vitro. The questions of practical importance are: can a sufficiently high concentration of penicillin be maintained for a sufficient time in the human body to kill all the typhoid bacilli

present in it, and, if not, what would be the effect of killing large numbers of the bacilli without achieving complete sterility ?

The concentration of sulphathiazole used in the experiments (10 mg. per 100 c.cm.) is one which can be maintained in the body. With this support the concentration of penicillin required to kill all the typhoid bacilli present depended mainly on their numbers. A concentration of 1 unit per c.cm. sufficed to sterilise 7000 typhoid bacilli per c.cm., and one of 4 units per c.cm. sterilised 70,000 per c.cm. We are here dealing with much higher concentrations of penicillin than are generally employed in treatment, but it seems certain that, with sufficient dosage of penicillin and optimum methods of application, a concentration of 2 or more units per c.cm. in the blood and tissue fluids could be maintained for as long as required. Such a concentration should be ample to kill the typhoid bacilli in the blood in the bacteræmic stage of the disease, but whether it would suffice for the probably more densely populated lymph-nodes, spleen, and liver is a matter of speculation since we know little of the numbers of bacilli present in these organs. Our aim should be to sterilise the body vis à vis typhoid bacilli, but if this concentration failed to sterilise it should certainly prevent multiplication of the bacilli in the body. We might thus hold the invaders in check until antibodies had developed in sufficient amount to deliver the coup de grâce, or we might further assist nature by the administration of antibacterial serum.

There is always a considerable element of hazard in applying the discoveries of the laboratory to the human patient, and it is only by attempting the treatment suggested that we can discover if theory can be applied to practice. A prima-facie case for the trial has been made. We can say with considerable confidence that, if the treatment does not benefit the typhoid patient, it is very unlikely to harm him.

My tentative suggestions as regards treatment are:

1. Commence treatment as soon as the diagnosis has been established.
2. Administer sulphathiazole regularly in full doses and simultaneously penicillin, preferably by continuous application, at the rate of 2½ to 3 million units a day, which should maintain a concentration of over 2 units per c.cm. in the serum.
3. Continue the treatment for at least 5 and preferably for 7 days. During this period pyrexia is to be expected from the release of toxic substances by the bacilli which have been killed and have undergone lysis.
4. Stop both treatments at the same time, and observe the patient for any evidence of the continued presence in the body of typhoid bacilli. If such should occur, resume treatment and continue for a further 4 days.
5. Control the effects of treatment by frequent blood and fæces cultures, using for the former broth containing *p*-aminobenzoic acid and penicillinase.

SUMMARY

Using broth freed from sulphonamide-antagonising substances by the method of Harper and Cawston, sulphathiazole was found to inhibit the growth of *Bact. typhosum* to a considerable extent. It had some bactericidal effect, but only on a small inoculum.

Penicillin in concentrations up to 8 units per c.cm. reduced but did not prevent the growth of *Bact. typhosum* in broth.

The combination of penicillin and sulphathiazole had a pronounced bactericidal effect on *Bact. typhosum*. Penicillin (4 units per c.cm.) with sulphathiazole (10 mg. per 100 c.cm.) sterilised broth containing 70,000 *Bact. typhosum* per c.cm. Penicillin (1 unit per c.cm.) with sulphathiazole (10 mg. per 100 c.cm) sterilised broth containing 7000 *Bact. typhosum* per c.cm.

Suggestions are made for the treatment of typhoid fever by penicillin and sulphathiazole.

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HYPERVENTILATION ASTHMA

HERBERT HERXHEIMER
L.R.C.P.E.

From the E.M.S. Rehabilitation Unit, Stanboroughs Hospital, Watford

BRONCHIAL asthma is a syndrome rather than a disease and can be brought on by allergic factors outside the patient (extrinsic), or within the patient (intrinsic), or both. The intrinsic may be metabolic (endocrine), psychological ("nervous asthma"), infection (acute bronchitis), or primary emphysema. In all cases bronchial spasm followed by asthma is elicited very easily, and in many patients, once the syndrome has been established, the spasm can be elicited by various "trigger" factors, not only allergic but also of different origin.

It seems to be certain that this disposition to bronchial spasm can be present from birth—many children develop asthma very early—but there is an important group of intrinsic asthma where the syndrome develops only at the age of about 40, thus suggesting that it is acquired. Even in these cases the tendency may have been present from birth—the gun may have been loaded, to use the metaphor of Rackemann (1938), but the trigger has not been pressed till late, when a suitable trigger factor developed. One of these trigger mechanisms to which little attention seems to have been paid is hyperventilation and in some cases hyperventilation seems to be the only cause of the asthma.

It is difficult to estimate in what proportion of cases of asthma hyperventilation through excitement or muscular exercise acts as a releasing mechanism. In many cases voluntary hyperventilation has no such effect; and in others muscular exercise is well tolerated. In some of them voluntary hyperventilation even seems to be beneficial.

METHOD OF INVESTIGATION

The following six cases of hyperventilation asthma were selected from 19 consecutive patients with bronchial asthma who were investigated clinically and experimentally. All patients but one (case 4) were under ward observation for at least some weeks. The respiration was in all cases graphically recorded with a spirometer of the Benedict type, as used for estimating the basal metabolic rate. The vital capacity and its subdivisions were determined in the same way. Muscular exercise consisted of short runs of 2–4 min. Immediately after the run the subject hurried back to the spirometer. Between the end of the run and the beginning of the recording of the respiration during recovery usually half a minute was lost. All these determinations were carried out in a sitting position, which is why the respiratory volume (R.V.) is slightly higher than under basal conditions. CO_2 hyperventilation was carried out with a wide rebreathing-tube of corrugated rubber. The length of this tube was varied to obtain a R.V. comparable with the volume reached in voluntary hyperventilation. Before each experiment the chest was auscultated, to exclude patients with rhonchi. A wheeze was said to be present if the patient felt it and at the same time rhonchi could be heard on auscultation. It is considered that this wheeze is the first definite clinical sign of bronchospasm and therefore marks the beginning of the asthma attack. To illustrate the normal reaction to hyperventilation and to a short sharp run, two such experiments have been carried out with a normal subject (figs. 1 and 2).

CASE-RECORDS

CASE 1.—A girl, aged 15, admitted under Dr. Andrew Morland, had had asthma attacks since the age of 2 years. Tonsils were removed at 2 years. Attacks equally frequent in winter and summer, more numerous during the last 2 years, now every 4–6 weeks. Some of the attacks developed after cycling long distances (not after cycling 2 miles to school) or after playing hockey. When she was expected to go to a party her mother never told her beforehand, as she would otherwise have an attack before going. On examination, including radiography, nothing abnormal was detected (N.A.D.) in the chest and internal organs.

Skin Tests: no positive reaction. *Differential White-cell Count*: 9% eosinophils on admission; 3 weeks later 5·5%.

Respiration.—In rest, the R.V. was usually increased, being 13·0–26·0 litres per min. (l./min.). The respiration was very irregular. Vital capacity usually about 4000 c.cm., subdivisions normal (fig. 3).

Exercise.—Cycling for 1 min. did not lead to any abnormal reaction. Running: a sharp run of 2 min. led to a heavy increase in respiration; 2 min. after the end of the run a slight wheeze developed. The vital capacity did not decrease, but the reserve air increased during this period from 36% to 43% (normal limits 20%–41%). The wheeze disappeared after 5 min. After a run of only 1 min. 20 sec. a short and transient wheeze appeared in the 6th min. (fig. 4).

Hyperventilation.—Voluntary hyperventilation of 48–64 l./min. for 2–3 min. caused during the last minute a feeling of tightness in the chest and immediately afterwards a wheeze with bronchitic rhonchi. At the same time tension round the mouth and pins-and-needles in hands and feet developed. The wheeze became gradually worse, and the vital capacity decreased from 3900 c.cm. in steps to 3260 c.cm., whereas the reserve air increased from 34% to 54%. This slight asthma attack lasted 15 min. and had eventually to be stopped with ephedrine inhalation (fig. 3).

This reaction was the same after ammonium chloride 1·0 g. t.d.s. had been given for 3 days previously. If, however, alkaline powder (sod. cit. 5 g., pot. cit. 1·5 g., sod. bicarb. 3·5 g., 1 teaspoonful q.d.s.) was given for 3 days previously, the asthma attack was transient. No signs of tetany were seen then, the wheeze lasted only 2 min. and disappeared without any need of ephedrine, and no decrease of the vital capacity was observed in one experiment. In another, however, the vital capacity decreased from 3870 c.cm. to 3620 c.cm., and the reserve air increased from 32% to 42%. When hyperventilation was carried out with CO_2 through a rebreathing-tube, R.V. was increased to 41 l./min. for 6 min. in one experiment, and to 37 l./min. for 5 min. in another. In neither of these was any sign of wheeze, asthma, or tetany seen. After hyperventilation, whether induced voluntarily or with CO_2, the respiration never decreased to a short period of apnœa, as would be expected normally; it returned to its former latent hyperpnœa.

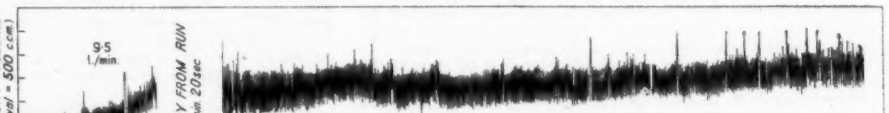

Fig. 2—Normal subject. Recovery from sharp run. After 19 min. respiration has almost returned to normal.

The history suggests that two factors acted as triggers producing the asthma; hyperventilation (caused by excitement) and heavy muscular exertion. The first is made probable by the fact that voluntary hyperventilation in normal conditions provokes tetany, indicating an increase of the blood pH. Both asthma and tetany can be prevented if hyperventilation is produced by CO_2 breathing—i.e., if the excess removal of CO_2 from the blood with its consequence for the blood pH is prevented. If bicarbonate base is given before voluntary hyperventilation, the asthma attack cannot be prevented but is much shorter and less severe.

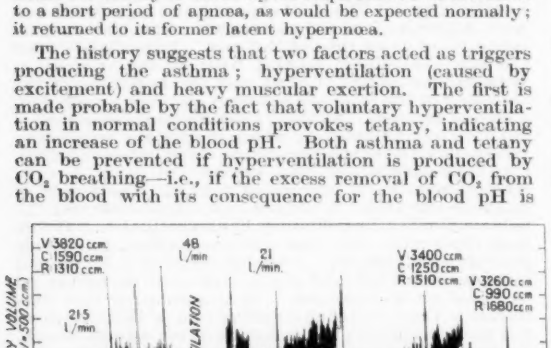

Fig. 3—Voluntary hyperventilation in bronchial asthma (case 1). A wheeze appears towards the end of the 2-min. period of hyperventilation and continues during the whole recovery, increasing in strength until ephedrine inhalation is given to stop the asthmatic attack. The vital capacity (V) decreases from 3820 c.cm. to 3260 c.cm., and the percentage of reserve air (R) increases. Note that the patient is already hyperventilating at rest, and that after the voluntary hyperventilation there is no period of relative apnœa (C = complemental air.)

↑ Spirometer refilled.

CASE 2.—A woman, aged 34, admitted under Dr. Morland. No serious disease in the past. The first attack of asthma occurred 18 months before admission. On this occasion she was out in the evening at a party and nearly missed the last bus home. She had to run fast and far to catch it, and the attack developed in the bus and lasted all night, needing medical attention. Frequent attacks since, often after excitement—e.g., after laughing. For 5 months after discharge from hospital patient remained free from attacks, apart from a short spell of asthma following a febrile cold in the head. Chest radiography and internal organs: N.A.D.

Skin Tests not carried out. *Differential White-cell Count*: 1·5% eosinophils.

Respiration.—Breathing was always irregular, with an inclination to spontaneous hyperventilation. Vital capacity was on admission 2420 c.cm., with normal subdivisions, and increased under graduated physical exercise to 3210 c.cm.

Exercise.—Short and heavy exercise (cycling for 1 min.) did not provoke an attack; prolonged exercise was not tried.

Hyperventilation.—Voluntary hyperventilation for 2 min. led to a feeling of tightness in the chest, and ½ min. later to an audible wheeze and bronchitic rhonchi. This condition lasted 20 min. Other experiments with hyperventilation were not attempted.

In this case again the history suggests that muscular exercise and hyperventilation constitute trigger mechanisms. Infective catarrh of the air passages is another trigger. For hyperventilation this mechanism has been proved by experiment.

CASE 3.—A woman, aged 28, admitted under Dr. Kenneth Harris. Had rheumatic fever in 1928. During this illness mitral stenosis and auricular fibrillation developed; the latter is controlled with small doses of digitalis. She had been in hospital 14 times since, mostly because of attacks of bronchitis or bronchial asthma. From time to time she had palpitations which caused a feeling of anxiety and breathlessness. Subsequently asthmatic wheezes sometimes developed. Sexual intercourse very often led to long and severe asthma attacks. There have been several attacks of urticaria. Slow auricular fibrillation. Radiography showed slight congestion of lung vessels; enlargement of the heart, especially of left auricle.

Skin Tests.—Positive reaction against many different proteins. *Differential White-cell Count*: 1·5% eosinophils.

Respiration.—Regular. The curve shows a slight tendency to hyperpnœa as often seen in patients with chronic venous congestion. The vital capacity was definitely reduced by about 15%. The R.V. in rest was 10·0–15·0 l./min.

Hyperventilation.—Voluntary hyperventilation for 2–3 min. led to a slight but typical asthma attack, lasting 5 min. in one experiment and, with interruptions, 7 min. in another. During these attacks the vital capacity was reduced from 1990 c.cm. to 1760 c.cm. and from 2070 c.cm. to 1920 c.cm. respectively. The reserve air increased from 32% to 38% and from 38% to 45% respectively. In the second experiment the wheeze tended to disappear after 3 min. but could be brought back by a few very deep respirations. The attacks disappeared spontaneously, and the respiration then returned to a more normal level than before (7·9 and 11·7 l./min.). Hyperventilation with CO_2 (26 l./min. for 7 min.) produced no asthma attack.

In this case the main trigger mechanism seems to be febrile infection of the air-passages, which, supported by the chronic venous congestion of the lungs, leads quickly to febrile bronchitis. Apart from that, numerous foreign proteins and excitement seem to be causal, the

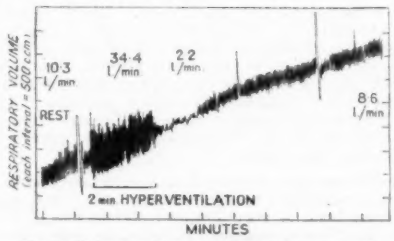

Fig. 1—Voluntary hyperventilation in a normal subject. Immediately after hyperventilation the respiration approaches apnœa.

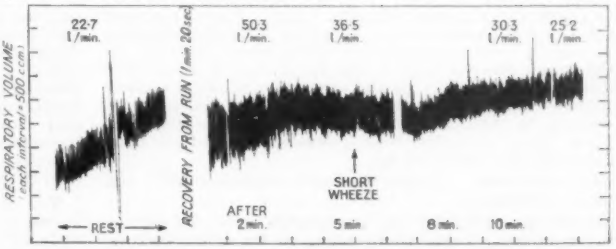

Fig. 4—Bronchial asthma (case 1). Recovery from very short run. Even after this very short exercise the respiration is more than doubled, and it takes 12 min. to return to near the resting value. In this case the exercise was not strong enough to produce a real asthmatic attack, but a short wheeze appeared during the 6th min., lasting about 2 min.

latter probably by producing hyperventilation, which has been proved to provoke an asthma attack. In this case, as in case 1, only hyperventilation connected with loss of excess CO_2 caused an attack; CO_2 hyperventilation was without this effect.

CASE 4.—A boy, aged 14, had had his first attacks of asthma at the age of 9, after eating habitually a large number of eggs. At the same time urticaria developed. The attacks used to come on during that time also after a cold in the head. When after a year the eggs were restricted to 2 a week, the asthma ceased completely. Now for about a year he had noticed that a typical wheeze came on when he ran hard for 50–100 yards; the wheeze lasted then for about ½ hr. After a cross-country run it might last the whole day. It never developed during the run but a few minutes afterwards. Sporadic asthma attacks came on after inhaling SO_2 or, more slightly, after inhaling other fumes, such as N_2O_4, in the chemical laboratory. Internal organs: N.A.D.

Skin Tests not carried out. *Differential White-cell Count*: 4% eosinophils.

Respiration.—Tendency to be irregular, sometimes gross hyperpnœa, especially if attention was not diverted. R.V. at rest 12–14 l./min. Vital capacity normal, with normal subdivisions.

Exercise.—Sharp runs of 2 min. produced with great regularity (5 experiments) a slight but typical asthma attack. This developed only 2–5 min. after the run and lasted 2–3 min. The vital capacity during the wheeze fell, in one typical experiment, from 2960 c.cm. to 2520 c.cm. The percentage of reserve air did not change. Normal vital capacity was reached 8 min. after the run, but hyperpnœa continued for a long time after the asthma attack had ceased.

Doses of alkaline powder and of ammonium chloride during the days preceding the exercise had no clear effect. The wheeze was sometimes shorter, sometimes longer, without definite relation to the substance given. The only means of suppressing the attack was to connect the patient immediately after the run with a CO_2 rebreathing-tube. If he breathed through this tube for 6 min. and the tube was then shortened gradually during the next 4 min. and eventually taken off, no attack came on.

Hyperventilation.—Voluntary hyperventilation for 3 min. produced a short wheeze lasting only 1 min. CO_2 hyperventilation did not cause any wheeze.

In this case the trigger mechanisms were some proteins (eggs), local irritants (various kinds of gases), febrile bronchitis, muscular exercise, and high degrees of hyperventilation.

CASE 5.—A boy, aged 15, admitted under Dr. Morland. No serious illness apart from asthma attacks since early childhood. Once or twice such attacks came on after football. Once he noted that, when he was involved in a prolonged argument at work, his chest felt tight, as if an attack would develop, but it did not. Internal organs and radiography of chest: N.A.D.

Skin Tests.—Mixed inhalants gave a strongly positive reaction; other inhalants a positive; eggs and milk a positive. *Differential White-cell Count*: eosinophils 4%.

Respiration.—Often irregular with a tendency to hyperventilate. R.V. in rest 10·0–11·2 l./min. Vital capacity normal; subdivisions normal.

Exercise.—After a sharp run of 2 min. no asthma attack developed but the respiration remained very high for a long time: 36·3 l. in the 2nd min., 40·7 l. in the 4th, 38·0 l. in the 6th. In the 12th min. it was 27·2 l. (whereas normally it should be near the normal 10–12 min. after this kind of exercise) and even after 19 min. it was much higher than normal (fig. 5).

After a longer run of 4½ min. a wheeze was observed after 1 min., and a full asthma attack developed subsequently, with the vital capacity going down from 3145 c.cm. to 1720 c.cm. Ephedrine had to be given to stop the attack. If a long rebreathing-tube was given immediately after the end of the run, no wheeze and no attack developed in one experiment; in another experiment rhonchi could be heard 5 min. after the run, and they lasted 1–2 min. The patient, however, did not feel any wheeze or any tightness. No stronger attack developed.

Hyperventilation.—Voluntary hyperventilation caused a short and transient wheeze (1–2 min.) only during the 4th min. Immediately afterwards there was a short period of hypopnœa (4·7 l./min.). This is a normal reaction, although in a normal person the hypopnœa would be more pronounced. CO_2 hyperventilation (25 l./min. for 7 min. and 39 l./min. for 8 min.) did not cause any wheeze.

The trigger mechanisms here seem to be foreign proteins, hyperventilation, and exercise. This could be shown for hyperventilation and for exercise only in prolonged experiments. The development of the asthma attack could be prevented by CO_2 breathing.

CASE 6.—A boy, aged 12, admitted under Dr. Morland. No serious illness. Asthma attacks for 7 years. Attacks first developed mainly during febrile bronchitis. No attacks during the last 2 weeks while in hospital. Often wheezy after running. Before his admission to hospital he had attacks of asthma every morning between 5 A.M. and 8 A.M., especially when he slept in the air-raid shelter. He is an only child, and the mother seems to have been frightened by the air-raids. Internal organs and radiography of chest: N.A.D.

Skin Tests negative. *Differential White-cell Count*: 3% eosinophils.

Respiration.—Fairly regular; no tendency to overbreathe (resting R.V. 9·0–13·0 l./min.). Vital capacity normal; subdivisions normal.

Exercise.—Sharp run of 2 min. produced no attack but a very prolonged and excessive ventilation: R.V. 27·0 l. in the 2nd

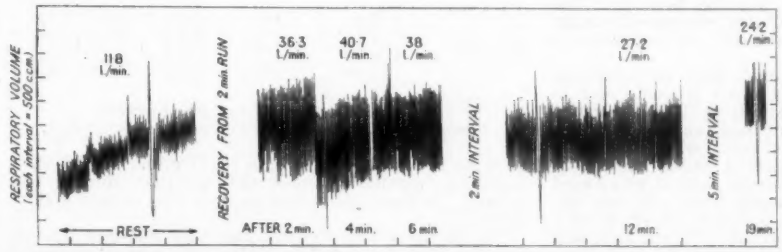

Fig. 5—Bronchial asthma (case 5). Recovery from short sharp run. The respiratory volume increases to an abnormally high value (if compared with a normal subject in fig. 2) and remains at more than double the resting value even after 19 min., whereas the normal subject has, at this time, almost returned to his basal level: excessive ventilation after exercise.

min., and 19·0 l. in the 9th min. After 12 min. recovery of the respiration was not yet complete. The vital capacity was slightly reduced during this period, from 2550 c.cm. to 2180 c.cm. Sharp run of 4 min. 12 sec. had a similar but more pronounced effect on the respiration, which remained extremely high for more than 15 min. The vital capacity decreased to 1830 c.cm. and the reserve air increased from 33% to 43%. A typical wheeze developed in the 6th min. of recovery and lasted 14 min.

Hyperventilation.—Voluntary hyperventilation did not produce asthma.

In this case exercise has been shown to be one of the trigger factors, while there seem to be other factors still unknown.

DISCUSSION

It appears from these cases that hyperventilation plays a distinct part in provoking asthma. In all but one (case 6) it has been possible to cause a slight or moderate asthma attack by voluntary hyperventilation. The question is now, which of the effects of hyperventilation is the direct cause. The increased respiratory movements and the increased flow of air can be excluded; we have caused similar changes of ventilation by CO_2-hyperventilation without producing asthma. There remain as factors the reduced acidity and the loss of CO_2 by the body. It did not appear necessary to prove that after hyperventilation an actual loss of CO_2 and an increase in pH took place. These experiments have been carried out so often by others that this change can be regarded as an established fact. Further, case 1 developed typical symptoms of tetany during hyperventilation, and the others at least showed the beginning of these symptoms: dizziness and sometimes very slight pins-and-needles.

Most of those patients (4 out of 5) in whom hyperventilation provoked an attack showed a typical history. They had noticed that after prolonged excitement (expectation of a thrilling event, laughter, prolonged argument, sexual intercourse) an attack developed. This suggests that the excitement caused hyperventilation, which in turn brought on the asthma. It is difficult to prove this, but it is made very probable by the resting respiratory curve of those patients who showed either a permanent hyperventilation or a strong tendency to hyperventilate. This tendency was so strong that any slight stimulus—e.g., a deep breath—caused an increase in the R.V. and irregularity of breathing. For a typical example see fig. 4.

Fig. 3 shows that hyperventilation was present from the beginning and became worse. In this experiment the R.V. was at first fairly large, but a deep breath at once caused a further increase. This habit of overbreathing is shown very clearly also in the period after voluntary hyperventilation. In a normal person, after overbreathing for 2–3 min., a period of very pronounced hypopnœa or even apnœa will follow; the R.V. will sink below the resting level and often approach zero for ½ min. (fig. 1). In our patients this reaction was either absent or subnormal; they continued to overbreathe as before the voluntary hyperventilation or to overbreathe even more (fig. 3). This reaction is paradoxical. When CO_2 has been removed from the blood to excess, the normal stimulus for the respiratory centre has gone, and the respiration comes near apnœa till sufficient CO_2 has accumulated to re-establish the normal rhythm gradually (fig. 1). In our patients the respiratory centre did not react in the same way, possibly because it was in a state of excitement in which the absence of certain amounts of CO_2 from the blood did not constitute a sufficient inhibitory influence.

This abnormality is not found only in asthmatic patients; it is found in many other patients and in normal subjects. Herxheimer and Kost (1929) described eight patients, most of whom had general nervous complaints or slight thyrotoxicosis, who habitually overbreathed. They were examined under basal conditions and during and after exercise, and it was found that in rest the R.V. was abnormally high, and that the respiratory quotient (R.Q.) was above 0·8 and often, for a short period, even over 1·0, a sign that CO_2 was breathed off to excess. From these and many other similar experiments it can be concluded that an abnormally high R.V. in rest indicates (in a subject with an approximately normal basal metabolic rate) a high R.Q. for that period: this means removal of CO_2 to excess. There is little doubt that our patients belong to the same respiratory type. They have at times a natural tendency to overbreathe; and, if there is any excitement, the overbreathing will unconsciously increase, possibly for hours, and thus in some instances produce asthma. This mechanism may be the cause of many so far unexplained attacks of asthma of the "nervous" type, where no allergic cause can be found.

Two small children aged 4 years I have seen lately seem to belong to the same category. The history, given independently by the mothers, is very similar: When the child is naughty and has "to be punished slightly, he gets furious, crying and sobbing all the time. This will go on even when he is put to bed, and after 5–10 min. he is certain to get one of his asthma attacks."

There are some cases of bronchial asthma where a long coughing attack is the primary event, and the typical asthma attack with a wheeze follows after some minutes. It might be possible that also in these cases hyperventilation by coughing plays a causal part.

We should now examine the part played by muscular exercise in provoking asthma. Short severe exercise causes a rather complicated change in gaseous metabolism, which was first described by Hill et al. (1924). In this type of exercise, comparable in intensity to the quarter or half-mile run, so much lactic acid is formed that it often raises its blood-level to more than 100 mg. per 100 c.cm. (Jervell 1928). This excess of lactic acid liberates CO_2 from bicarbonate, forming lactate, and the CO_2 thus liberated increases the arterial CO_2 tension. This increase of arterial CO_2 tension was first shown by Douglas and Haldane (1909) and immediately after short severe exercise it may reach values over 70 mm. Hg (Herxheimer 1926). The excess CO_2 directly or indirectly stimulates the respiratory centre so strongly that ventilation increases steeply, causing the feeling of extreme breathlessness until all the excess CO_2 has been eliminated. During this period the R.Q. rises to values above 1·0, and occasionally it even approaches 2·0. When the exercise is over, the reverse process takes place. Lactic acid is removed from the blood, with a subsequent tendency to replace this loss of acid by the retention of CO_2. The period of excess release of CO_2 with an abnormally high R.Q. is thus followed by a retention of CO_2 with an abnormally low R.Q., which will usually vary from 0·5 to 0·6. (The normal R.Q. varies from about 0·7, pure combustion of fat, to 1·0, pure combustion of carbohydrates.) This retention lasts for some minutes till sufficient CO_2 has been retained, and then the R.Q. gradually becomes normal again, when it represents the actual combustions going on in the body.

In persons who habitually overbreathe this retention of CO_2 does not take place, or it takes place at a later stage, when breathing has become less excited. Herxheimer and Kost (1929) described some exercise experiments with such persons. A typical example is given in the accompanying table. Recovery after this kind of exercise is usually complete in 12–17 min. In this case, however, ventilation does not decrease during this period. It rises again, and so does CO_2 output and O_2 intake.

EFFECT OF EXERCISE IN AN HABITUAL OVERBREATHER

		R.V. per min.	CO_2 per min.	O_2 per min.	R.Q.
Rest		7·43	206·8	247·4	0·836 (*a*)
Work *					
Work and recovery 0–2 min.		68·1	2020·0	1882·0	1·073
Recovery	2–4 ,,	43·1	1398·0	874·6	1·599
	4–7 ,,	33·0	908·8	488·2	1·659
	7–12 ,,	21·5	528·3	485·0	1·115 (*b*)
	12–17 ,,	15·2	335·2	347·0	0·966
	17–22 ,,	20·2	422·1	421·4	1·002

* Climbing staircase 17·3 m. high in 30 sec.

Remarks.—(*a*) Increased. (*b*) Pins-and-needles in hands.

In our cases only the R.V. has been followed up. It remains high for an abnormally long period compared with the reaction of a normal person (figs. 2, 4, 5). The difference between a normal person's and the patients

R.V. during recovery is very striking. This makes it very probable that more CO_2 is breathed off by these subjects than required by the exercise. Further, it must be considered that the asthma attack never develops during the exercise, nor even immediately afterwards, but 2 min. or more after its end. This is exactly the period during which CO_2 is retained normally. In our cases there is strong evidence that it is not retained. It is suggested that this excess loss of CO_2, with the subsequent shift of pH, causes the bronchial spasm as in voluntary hyperventilation. Additional evidence lies in the fact that, in the two experiments in which it was attempted, CO_2 breathing immediately after the exercise prevented the development of the attack; in a third it nearly prevented it. It is concluded from this that, at least in these cases, the asthma attack after exercise is due to excess hyperventilation during recovery.

SUMMARY

Five cases are reported where slight but typical attacks of bronchial asthma were provoked by voluntary hyperventilation. The history suggests that some of the former asthma attacks of these patients were caused by unconscious hyperventilation during excitement.

In other cases asthma attacks could be provoked by short exercise. They developed during the recovery period. It is suggested that this is also due to excessive ventilation which prevents the normal CO_2 retention during recovery.

In each group no asthma attack could be produced if the excess loss of CO_2 from the body was prevented.

The significance of hyperventilation as a trigger mechanism in bronchial asthma is discussed.

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LOCAL PENICILLIN FOR THROAT INFECTIONS

R. G. S. MEADLEY, M.B. Leeds — SQUADRON-LEADER, R.A.F. MEDICAL BRANCH

H. F. BARNARD, M.B. Lond. — PATHOLOGIST, DRIFFIELD EMERGENCY HOSPITAL

LOCAL therapy of the pharynx and tonsillar region may be achieved through either the mouth or the nose. In the attempt to maintain an adequate concentration of a drug round the inflamed tissues over an adequate period each route has certain advantages. Most throat pathogens are readily destroyed by a small fraction of a unit of penicillin per c.cm. if its application is maintained for some hours. But to penetrate to the organism and to maintain this concentratiom over some hours an original concentration many times greater is necessary.

PRELIMINARY TESTS

Oral Route.—Various methods of application of penicillin for affections of the mouth have been recommended by different writers, chiefly for treating Vincent's angina, for which uniformly favourable results are reported.

Shallenberger et al. (1945) found that in Vincent's angina swabbing with penicillin solution 500 units per c.cm. 4 times a day was rapidly effective. Strock (1944) and Shuessler et al. (1945) have found penicillin spray or mouth-wash also effective in this condition, and Schwartz (1945) found intramuscular penicillin 100,000 units very successful.

Penicillin pastilles have been chiefly used in this country. MacGregor and Long (1944) used a gelatin pastille which took a variable number of minutes to dissolve. Glucose tablets containing penicillin for oral use (Burroughs Wellcome & Co. and Rowntree & Co. Ltd.) are large (2·0 cm. × 0·5 cm.) and take 10–15 minutes to dissolve if sucked normally, or longer if one suppresses the sucking-reflex. Thus, though pastilles commend themselves for simplicity, their duration is not great; and their value is somewhat nullified by the increase in saliva they produce, which speedily carries to waste much of the antiseptic which might have remained in the mouth and pharynx.

Some tests have been made with fragments of the small tablets of 10,000 units made for general therapy. A very small tablet of this nature dissolves, scarcely noticed, under the tongue in about 2 minutes, without appreciable salivation, and penicillin may be detected in the throat and mouth secretions in useful concentration for a considerable time thereafter (table I).

Nasal Route.—Penicillin snuff has been recommended in the treatment of nasal conditions (Delafield et al. 1941) so it seemed desirable to investigate its possibilities in the treatment of throat infections. The method of administration used is simple.

Penicillin 10,000 units per gramme in sulphathiazole is kept in a small bottle, the metal lid of which has a hole for pouring. A small heap (about 1 cm. in diameter) is poured on to a piece of paper 2 in. square, creased obliquely. With the head back and one nostril closed with the finger, the snuff is tipped from the paper into the other nostril, to the accompaniment of a sharp sniff; the process is then repeated on the other side. The two amounts total about 0·1 g., or 1000 units of penicillin. The film of snuff-coated mucus lining the nose is slowly carried back by the cilia to the pharynx and posterior surface of the tongue. Swallowing and movement of the tongue now bring some of the antiseptic forwards to the fauces. As a visible indicator methylene-blue in glycerin was instilled into the nose; it appeared in the pharynx in about 5 minutes, and round the fauces some minutes later. Arnett (1943) and Vollum and Wilson (1945), using methylene-blue pastilles, found that the pharynx and the tonsils were not coloured appreciably, whereas MacGregor and Long (1945a), though agreeing with regard to the pharynx, found the tonsils well coloured in their tests. Irritative secretion with dyes in the nose, especially in powder form, complicates this method of tracking drugs in the nose, but it is clear that the pharynx, at least, is exposed to a good concentration by this route.

The concentration and persistence of penicillin in the oropharyngeal secretions were tested in volunteers in the following manner. At 1, 2, 3, and 4 hours after taking snuff the volunteer mixed the mucosalivary secretion of the pharynx with that of the mouth and spat 1–2 c.cm. into a sterile tube. During this 4-hour period no food or drink was taken. These samples were tested by the bore-hole plate method. Each test dose was repeated next day; the table therefore shows figures in duplicate. The same volunteers each made the eight tests on successive days. There is some difficulty in persuading people to produce secretions from the pharynx and the fauces; hence explanation and rehearsal were necessary.

Numerous samples from different volunteers showed penicillin detectable 1–4 hours after snuff. The results are irregular, even in the same person at different times, presumably owing to the irregularity of mouth movements and dispersal in a mucoid secretion. Typical results from 4 consecutive volunteers are shown in table I. The taking of a meal clears the throat of penicillin. It seemed, therefore, that a snuff of penicillin 1000 units would maintain a reasonable concentration over the infected tissues for the best part of 4 hours, if no food were taken during this period. A possible advantage of the snuff over the oral pastille is the simultaneous treatment of the nose, nasopharynx, and openings of the sinuses and middle ear.

CLINICAL TRIALS

Selection of Cases.—The patients selected for this investigation were R.A.F and W.A.A.F. personnel of an operational station of Bomber Command. Observations were made on 57 successive cases of acute tonsillitis which occurred sporadically in the 8 months December, 1944–July, 1945. Of these 57 cases, 27 were treated with the penicillin-sulphathiazole snuff ('Penithiazole') and 30 acted as controls, receiving routine treatment. During the greater part of the investigation there was no selective discrimination, alternate cases being treated with penithiazole. It thus happened that at first a large proportion of the cases of Vincent's infection were treated with penithiazole; so towards the end of the

TABLE I—CONCENTRATION OF PENICILLIN IN THROAT AND MOUTH SECRETIONS AFTER PENICILLIN SNUFF AND ORAL TABLETS

	Volunteer A				Volunteer B				Volunteer C				Volunteer D				Average				Approx. units/ml.			
Interval (hr) ..	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Snuff 1000 units	25	23	17	16	40	35	36	29	18	10	10	10	39	Tr	10	10	30	48	20	17	2·0	0·3	0·4	0·3
	20	17	38	27	45	43	32	25	13	Tr	27	10	40	10	15	Tr								
Snuff 5000 units	29	21	26	37	50	42	27	23	33	22	Tr	10	25	38	30	17	36	32	30	23	5·0	2·0	1·8	0·5
	20	10	16	10	47	46	44	32	47	46	44	32	40	27	38	20								
Tablet 1000 units	20	Tr	10	10	33	12	Tr	10	17	10	10	10	33	25	19	Tr	30	18	14	11	2·0	0·3	0·2	0·05
	33	23	Tr	10	26	17	19	10	39	29	14	15	36	15	Tr	20								
Tablet 5000 units	39	27	20	17	40	34	22	10	38	35	32	23	26	27	10	10	34	25	17	13	3·5	0·8	0·3	0·2
	26	22	17	24	29	22	10	10	39	19	Tr	12	34	18	13	14								

The figures are the diameter in mm. of the inhibition zones in bore-hole plates using the Oxford staphylococcus H and a bore-hole 10 mm. in diam. Tr = Trace of inhibition. 10 = No inhibition. The right-hand column gives approximate equivalent in units per c.cm.

series cases infected with Vincent's organisms were selected as controls to establish approximate equality between the two groups.

Bacteriological Examination.—A throat swab was taken from all the patients on admission to sick-quarters, before any treatment was begun. The swab was immediately sent by hand to the laboratory, where it was plated out, usually within 2–3 hours, on blood-agar and incubated, in the great majority of cases anaerobically. Direct films were made at the same time to determine the presence of organisms of Vincent's angina. In some cases suspicious organisms were tested for soluble hæmolysin.

A further swab was taken and treated in a similar manner after the patient had been treated 3 days; and, in the case of Vincent's infections, further swabs were taken at 3-day intervals until a negative result was obtained. Snuff was discontinued for at least 12 hours before swabbing, after which snuff was again given.

Treatment.—The penicillin-sulphathiazole snuff, containing 1000 units per dose, was administered at 4-hourly intervals during the day, the times being so arranged that no food or drink was taken between doses. In only 2 cases was any difficulty experienced in inhaling the snuff. This was due to occlusion of the nostrils by thick mucus, and in these cases the inhalation of the snuff was preceded by gentle lavage of the nostrils with warm normal saline. The cases treated with penithiazole received no other treatment of any kind other than aperients if required.

The control cases were given a routine treatment consisting of gargles (either thymol or pot. chlor. and phenol), and any local discomfort was relieved with throat paints or codeine. Sedative expectorant mixtures or linctus codeinæ were given to patients developing a cough. The more severe hæmolytic streptococcal infections received sulphathiazole in initial doses of 2 g. followed by 1 g. 4-hourly for the requisite period.

All the patients were accommodated in the sick-quarters and received similar diets, the actual diet depending on the clinical progress.

Clinical Observations.—The patients found no difficulty in the inhalation of the snuff, which was devoid of any discomfort other than a very transient tingling in the nose in the few cases in which there was an associated acute rhinitis. No harmful effects from the treatment were detected.

Relief of symptoms was rapid in the cases treated with penithiazole, whether the infection was streptococcal or with Vincent's organisms. At the outset of the experiment it was thought that a patient who was having only the snuff, and happened to be in the next bed to a patient having frequent hot gargles, throat paint, &c., might feel that he was not receiving adequate medical attention; but it was soon found that the relief of symptoms was so rapid in the test cases that no grievance was likely to arise.

Patients with a severe streptococcal tonsillitis treated with snuff usually made a more rapid convalescence than the controls and less frequently required a period of sick leave before returning to full duty. The fitness of a patient to return to full duty was assessed with the strictest impartiality, so that the data relating to the duration of the illness should not in any way be affected. In the case of patients who were members of air-crew, only the time during which they were unfit for full ground duties was taken into consideration.

Two severe cases with deep lesions, which did not respond after 5 days' treatment with penithiazole, indicate where systemic penicillin is desirable. One was a deep sloughing ulcer showing profuse Vincent's organisms, a high pyrexia, and a deteriorating general condition. The other was a hæmolytic streptococcal tonsillitis developing into a quinsy. Penicillin 20,000 units given 2-hourly for 5 doses produced in both an immediate dramatic recovery.

ANALYSIS OF CLINICAL AND BACTERIOLOGICAL RESULTS

The duration of illness in the two groups, judged by the average number of days off duty, was as follows:

	Hæmolytic streptococci and other infections *		*Vincent's angina*	
	Cases	Days off duty	Cases	Days off duty
Treated with penithiazole	14	7·6	13	11·0
Controls	22	9·6	8	16·8

*No Vincent's organisms found.

It will be seen that the patients with hæmolytic streptococcal infections treated with penithiazole were, on the average, off duty 2 days less than the controls; and that in the Vincent's infections the average period of non-effectiveness was reduced by 5·8 days in the cases treated with penithiazole. A statistical examination shows that the difference in the Vincent's-angina group is almost certainly significant. That in the streptococcal group is of little significance statistically, but clinical impressions lend weight to the difference. It may be observed that, had the two exceptionally severe cases mentioned above been omitted, the figures in each group would have shown a notably larger difference.

TABLE II—BACTERIOLOGICAL RESULTS

Organisms present after 3 days' treatment	*Hæmolytic streptococci* * Percentage of cases		*Vincent's organisms* Percentage of cases	
	Treated with penithiazole	Controls	Treated with penithiazole	Controls
Large decrease ..	16·9	5·6	36·3	18·1
Slight decrease ..	16·9	13·2	13·6	9·0
No change	9·4	28·5	4·5	4·5
Increase	1·8	7·5	4·5	9·0

* No Vincent's organisms found.

DISCUSSION

The number of cases in the series is small and not all of one bacterial causation, and clinical impression suggested a greater benefit from the snuff than the number of days off duty indicate. The beneficial results in the streptococcal group might have been achieved by

swallowing tablets of a sulphonamide, as was occasionally given in the control series. But, even should this be so, the simplicity and safety of this method give it a place where an extensive outbreak or some other circumstance renders individual medical supervision difficult. For Vincent's angina penicillin is the drug of choice.

The combined attack on tonsillitis from without by local therapy and from within by systemic penicillin, although not yet tested here, might be reasonably expected to give better results than either alone. It is unlikely that in this series the small amounts of sulphonamide or penicillin which might have been absorbed into the blood-stream had an appreciable effect. Where infection is deep or severe, whether it be Vincent's organisms or streptococcal, systemic treatment is clearly called for.

No comparison has been made clinically between the snuff and the small oral pastille; and in an oropharyngeal infection the latter may be equally efficacious, whereas in gingivitis a pastille will be preferable (MacGregor and Long 1945b).

That many cases remain convalescent carriers is in line with the observations of MacGregor and Long (1944) and Robinson (1945) in the case of penicillin and the experience of many others with the sulphonamides (Coburn 1944). The carrier state remains an unsolved problem.

The effect of penicillin snuff in oropharyngeal infections and on the nasal flora makes it not unreasonable to use it prophylactically in virus infections, such as coryza or influenza, to reduce secondary bacterial invasion. It is desirable that this should be the subject of a controlled clinical trial, note being taken of the appearance of organisms resistant to penicillin and sulphathiazole.

SUMMARY

Penicillin administered as small oral tablets of 1000–5000 units by mouth or in similar dosages as a snuff was found in the oropharyngeal secretions in useful concentration often for 4 hours.

Snuff of sulphathiazole containing 1000 units of penicillin per dose has been administered to alternate cases of 57 sore-throats due to hæmolytic streptococci or Vincent's organisms. The controls received gargles and throat sedatives.

A more rapid relief of symptoms and a shorter period off duty was obtained in the penicillin-treated cases, more especially in those with Vincent's angina.

Bacteriologically there was a probably significant clearing in both types of infection effected by penicillin snuff.

Two severe cases, one streptococcal and one of Vincent's angina, which did not respond to local penicillin but rapidly improved on systemic penicillin, are mentioned to show where systemic therapy becomes the method of choice.

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THE Cecil Joll Memorial Fund has reached £1050. The date of closure for subscriptions is March 1. The intention of the promoters was to ask the president and council of the Royal College of Surgeons to establish a biennial or triennial prize essay on a surgical subject.

HUMAN PULMONARY TUBERCULOSIS DUE TO AVIAN TUBERCLE BACILLI

REPORT OF A CASE

F. C. S. BRADBURY
M.D. Belf., D.P.H.
CONSULTANT TUBERCULOSIS OFFICER, LANCS. COUNTY COUNCIL

Pathological report by
J. A. YOUNG, M.B. Edin., Dipl. Bact.
SENIOR SCIENTIFIC OFFICER, INSTITUTE OF ANIMAL PATHOLOGY, CAMBRIDGE

ACCORDING to Gloyne (1933) no case of human tuberculosis due to avian-type tubercle bacilli had been reported in this country up to 1933, and I am not aware of any case having been reported since then. Practically all of the 14–20 cases so far recorded originated on the Continent, and of these only 3 were cases of pulmonary tuberculosis.

For some years I have typed all positive specimens dealt with in my laboratory, and as a result of this routine procedure the present case of avian infection was discovered. So far, among many hundred typings, only this one avian infection has been found, although other curiosities have been met, such as mixed human and bovine infection in the same subject.

CASE-RECORD

A man, aged 59, was first seen in July, 1942, because of a hæmoptysis, when his general condition was good, apart from the loss of a few pounds in weight. A few râles were noted at the right apex posteriorly. At this time a radiogram showed slight general opacity of the right apex, interspersed with fine streaky mottling. The rest of the lung fields showed nothing of note apart from a very small deposit at the extreme left apex. The patient was in good circumstances and declined to have sanatorium treatment or to coöperate with the dispensary organisation, apart from the submission of occasional specimens of sputum. Specimens cultured in July and November, 1942, and in September, 1943, all gave pure cultures of avian tubercle bacilli without admixture of other types. The diagnosis of type was based on the clearly defined characters of the organism when subcultured on the differential media which I use for this purpose; a description of this technique has not yet been published.

Through the kindness of Dr. J. A. Young, of the Institute of Animal Pathology, Cambridge, numerous animal-inoculation tests were made both with the material cultured by me from the patient's sputum and with material from sputum sent direct to Cambridge by the patient to avoid contamination or confusion in my laboratory. Dr. Young's report is appended to this communication.

The patient's progress could not be traced in detail, but in June, 1945, he came under observation again because of a further hæmoptysis, after having remained at work, except for short intervals, up to a month previously. This time he was a sick man, with much cough and sputum, dyspnœa, and pyrexia. A radiogram now showed that the disease on the right side had spread, and that large cavities were present above and below the clavicle; there had been a further involvement of the left upper lobe, where mottling now extended to the middle zone. The disease had progressed much as it might have been expected to if due to ordinary human-type tubercle bacilli.

COMMENTS

It does not appear possible to establish with certainty how this patient became infected with avian tubercle bacilli. He has never kept poultry, although he kept and bred over a hundred budgerigars for two years, between ten and twelve years before the onset of his illness in 1942. He did not allow the birds to peck morsels from his lips. He has had some slight contact with fowl carcases during his work as a hotel manager, but nothing closer than receiving them and handing them over to the chef. His family history is completely negative as regards tuberculosis.

If any of the foregoing suggested vehicles of infection were actually of much importance as determining factors in causing implantation of avian tubercle bacilli in the

human subject, such infection would probably be fairly common, since many people are exposed to similar risks.

There is, however, one feature of the present case in which the patient shows a quantitative peculiarity which distinguishes him from others—for many years before 1942 he was in the habit of taking every day a raw egg beaten up in milk, and often more than one. He assured me that it would be an understatement to say that for 30 years he had at least one raw egg daily in this manner. Raw eggs have been shown to contain living avian tubercle bacilli (Feldman 1938), and it seems reasonable to infer that the patient's infection was derived from this source.

According to Feldman only 13 proved cases of avian-type tuberculosis in man have been sufficiently investigated to be accepted beyond doubt. The results of animal-inoculation tests in the present case appear to place it in the same category. The following quotation from the same author leaves little if any comment for me to add :

> "When one considers the countless thousands of instances in which the type of the tubercle bacillus in human infections has been determined since the time of Koch, it may seem strange that the avian tubercle bacillus has been demonstrated so rarely. The explanation can only be that human beings have a formidable resistance to this particular form of the tubercle bacillus. The opportunities for infection are numerous, and if the avian tubercle bacillus were virulent in the accepted sense for human beings, it would seem reasonable to expect a far greater number of proved cases. Apparently, therefore, it is only the exceptional individual who becomes infected with the avian tubercle bacillus."

Of the 13 patients referred to, 6 died shortly after coming under observation; and, although Feldman does not describe in detail the clinical findings in the remainder. it is at any rate clear that avian infection cannot by any means be regarded as trivial. The position appears to be much the same as the comparison between bovine- and human-type infections in man: it seems to make little difference to the course of the disease, and there is no clinical picture which can be regarded as characteristic of one or other type.

In the present case the clinical course of the disease shows no well-marked difference from infections with human or bovine types of tubercle bacilli.

Tulloch (1935) sets out in some detail the criteria required to justify the acceptance of a strain of tubercle bacilli as being of avian type, including optimal temperature of growth and pathogenicity for animals. I attempted to adapt a temporary incubator to work at a temperature of 41–42° C. with the object of showing that the present avian strain grew better at this temperature than at 37–38° C.; but, owing to a series of difficulties with capsules and spark-suppressing condensers, the attempt was not successful. In view of the weight of other evidence it was not thought necessary to spend further time on this point. The criteria regarding pathogenicity for animals are amply fulfilled, as indicated in Dr. Young's report.

With regard to the use of tuberculin Tulloch states that ". . . although in the future it may be found that avian and mammalian tuberculins react specifically in relation to the type of invading bacillus, we should, for the present, adopt a critical attitude in relation thereto." Feldman (1938) goes a little further and suggests that, although a positive reaction to avian tuberculin associated with a positive reaction to mammalian tuberculin does not indicate an avian-type infection, the avian type of infection might be assumed to exist if the reaction to avian tuberculin was positive and the reaction to mammalian tuberculin was negative or considerably less intense. Gloyne (1933) records that 4 of the accepted cases of avian-type infection gave a positive avian tuberculin test with a negative or weak Old Tuberculin test.

In the present instance the patient was tested with avian tuberculin kindly supplied by Prof. T. Dalling, of the Ministry of Agriculture and Fisheries, and by standard human tuberculin prepared from Old Tuberculin (B.W.CO.). The avian tuberculin was in the form of a solution of purified protein derivative in a strength of 0·4 mg. per c.cm. This was used in dilutions of 1 in 4000 and 1 in 400, corresponding to 1 in 100,000 and 1 in 10,000 in terms of ordinary tuberculin. The patient gave a positive response (16 mm. diameter) to the intradermal injection of 0·1 c.cm. of 1 in 100,000 and 1 in 10,000 avian tuberculin and a completely negative response to 1 in 100,000, 1 in 10,000, and 1 in 1000 Old Tuberculin.

PATHOLOGICAL REPORT

Two strains, isolated from the patient's sputum at widely separated periods of time, have been studied as regards their morphological and cultural characteristics and their pathogenicity for laboratory animals.

The first specimen received was a subculture on unglycerinated Löwenstein's medium. To observe the growth of single colonies a small portion of the culture was inoculated subcutaneously into a guineapig and the strain re-isolated from the regional lymph-gland after three weeks.

The second specimen was a sample of sputum forwarded direct to Cambridge by the patient. The sputum was bloodstained and mucopurulent, and films stained with Ziehl-Neelsen revealed the presence of rather scanty acid-fast organisms, some of which were minute uniformly staining rods, while others were longer but thin and beaded. Other organisms were present, among which were streptococci in large numbers. These were destroyed by treatment with 5% KOH, and the acid-fast strain was isolated by both direct culture and indirect culture through guineapigs.

The cultural characteristics of both strains were very similar, any difference between them being attributable to the difference in lengths of time over which they had been grown on artificial media.

On unglycerinated egg medium the primary colonies, although readily visible to the naked eye by the 14th day, were small, moist, colourless, and highly convex, and their further growth was slow, for after several weeks most of the colonies were still relatively small shining domes, although there was a change in colour to creamy white. In the case of the more recently isolated strain many of the colonies developed a narrow crinkled margin, but in both strains crateriform colonies of secondary type were unusually scanty and late in developing.

Films prepared from young cultures and stained with Ziehl-Neelsen showed a preponderance of short acid-fast bacilli, but further films prepared after the colonies of secondary type had begun to appear revealed the typical picture of branching and numerous non-acid-fast forms.

On glycerinated egg medium the primary colonies were larger than those on unglycerinated egg and showed no tendency to marginal differentiation. Although they were distinctly more yellow than the colonies on unglycerinated egg, pigment formation was not well-marked, and in only one instance did the colonies take on a rich golden hue.

Subcultures on unglycerinated and glycerinated serum yielded moist, creamy white, and paint-like growths, more profuse on the latter medium, and subculture on glycerin potato produced a creamy white glistening nodular growth.

Pathogenicity.—Both strains were tested by the intravenous inoculation of 0·01 mg. and 0·001 mg. of a seven-day-old subculture on unglycerinated egg into rabbits and fowls, and in each case there was set up a progressive infection of a type characteristic of infection with an avian strain. The details of the post-mortem findings in two of the rabbits are given below.

RABBIT 169, inoculated intravenously with 0·01 mg., died 68 days later.

Lungs pale and œdematous, numerous small yellow tubercles.

Liver not enlarged; firm and waxy in appearance.

Spleen enlarged and congested; numerous pin-head tubercles.

Kidneys: numerous tiny ill-defined tubercles.

Appendix: a few ill-defined tubercles.

Peritoneum: tiny tubercles in region of kidneys and extending down line of ureters.

Knee-joints infected and femoral marrow replaced by granulomatous tissue. Tubercles in tendon sheaths at ankle-joints and in fascia over elbow-joints.

One small tubercle in right corneo-sclerotic junction and two in left lachrymal gland.

RABBIT 210, inoculated intravenously with 0·001 mg. was moribund when killed 99 days later.

Lungs: a few pin-head tubercles scattered over surface of crepitant lung.

Liver: two pin-head tubercles, tissue degenerate in appearance and interlobular markings prominent.

Spleen somewhat enlarged and congested. × 10 lens showed stippling with pin-point white foci.

Kidneys: × 10 lens showed numerous white pin-point foci on surface; one pin-head tubercle in capsule on right side.

Appendix: numerous pin-head lesions; also a few in cæcum.

Femoral marrow degenerated. Numerous pin-head tubercles in fascia and tendons round knee-joints. Epiphyses rarefied and breaking down. Right elbow-joint enlarged and cavity infected. Tubercles in both lachrymal glands.

In all four fowls lesions were found in lungs, liver, and spleen, the brunt of the infection being borne by liver and spleen.

Both strains proved incapable of setting up a progressive infection in guineapigs. The subcutaneous inoculation of 0·1 mg. of the first strain into two guineapigs produced local lesions and enlargement of the regional lymph-glands. The lesions, however, regressed after a few weeks; and, when the animals were killed 1 year and 76 days after inoculation, no macroscopical evidence of infection remained in one, while in the other the only trace of infection was a small caseous focus in the regional lymph-gland.

In the case of the second no measured dose was used, but of the two guineapigs inoculated directly with the patient's sputum the first, when killed at 42 days, showed only a healing ulcer, with a few underlying tiny caseous foci and a partly caseous regional gland, and in the second, killed six months after inoculation, all that remained at the site of inoculation was a small pigmented area. Further evidence of infection was limited to a small caseous area in the right inguinal gland.

In the case of both specimens the cultural characteristics of the organism, its pathogenicity for the rabbit and the fowl, and its lack of pathogenicity for the guineapig indicate that it is of avian type.

SUMMARY

A case of human pulmonary tuberculosis is described in which the causal organism is shown to satisfy most of the known criteria for regarding it as an avian tubercle bacillus and not to be at variance in any known respect with these criteria.

The patient also responds to avian tuberculin but not to human tuberculin.

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CONTROL OF SONNE DYSENTERY WITH SUCCINYLSULPHATHIAZOLE

R. L. VOLLUM, M.A., D.Phil. Oxfd
J. A. H. WYLIE, M.B. Lond.
From the Emergency Public Health Laboratory, Oxford

Two preparatory schools had been evacuated to a single country house. Dormitories and sick-rooms were separate, each school having its own matron. Each school had a bathroom, and indoor and outdoor water-closets were available. Kitchen and dining-room were shared. Communal games were sometimes played, and classes were taken together. At the beginning of each term during the previous 2 years there had been outbreaks of diarrhœa in both schools. No bacteriological examinations were made, but the clinical course suggested mild bacillary dysentery.

A similar but more extensive epidemic occurred in October, 1944. *Bacterium sonnei* was isolated from the fæces of the first 5 cases. Before the organism was identified, several further cases had developed, and at the request of the school doctor a more extensive investigation was undertaken. Rectal swabs from all the boys and members of the staff were taken; these were plated immediately on Leifson's desoxycholate-citrate-agar medium in which *para*-aminobenzoic acid had been incorporated, and the plates were incubated on return to the laboratory. The organisms were identified by the rapid diagnostic tube-agglutination method originally used by Topley and Ayrton (1924) and described in detail by one of us (Wylie 1944). *Bact. sonnei* was isolated from 17 out of 33 boys in school A and from 16 out of 37 boys in school B on the first examination.

TREATMENT

At first the amount of succinylsulphathiazole available was sufficient to treat only 10 cases: six cases selected from school A and 4 from school B were given 6 g. daily for five days. This was administered in six separate doses, each of two 0·5 g. tablets. All boys were swabbed weekly for the following three weeks. Two days after the end of the course of treatment only one of the 10 still had a positive swab. This was a persistent heavy carrier in school A, who was found to be excreting *Bact. sonnei* on 7 occasions in the next 2 months. The epidemic was still spreading in the schools, and within four weeks 8 out of the 10 treated cases were again yielding positive swabs.

In the meantime a larger supply of succinylsulphathiazole had become available, and it was decided to treat every boy in school B with 6 g. a day for 5 days, leaving school A as a control group. At the beginning of the course 23 of the 37 boys in school B were positive, only 5 boys in this school having remained negative throughout. In school A at this time only 3 of the 33 boys had escaped infection altogether. Ten days after the completion of the course all the boys in school B were negative; they remained so during the ensuing three months, except one who was positive on a single occasion three weeks after cessation of treatment.

In school A, the controls, 14 out of the 33 boys were still positive; of these, 4 continued to excrete *Bact. sonnei* during the next month. Further, 5 boys who had been negative at the start of the experiment relapsed during this period, and 2 fresh cases arose. At the beginning of the Christmas vacation these 11 carriers in school A were given a full course of succinylsulphathiazole. On reassembly after the holiday all the boys in both schools were bacteriologically examined for *Bact. sonnei* and found to be negative; they were all still negative when swabbed again two months later.

At no time during or after the administration of this dosage of succinylsulphathiazole were any toxic symptoms observed.

DISCUSSION

The drug treatment of institutional dysentery usually presents a serious administrative problem. The earlier attempts at chemotherapy were not very successful, mainly because treatment had to be carried out with the soluble sulphonamide compounds, such as sulphanilamide and sulphapyridine. Since these drugs are absorbed mainly from the upper part of the small intestine, large doses with a corresponding risk of intoxication had to be given in an attempt to maintain a sufficiently high concentration at the site of the disease in the colon and rectum. The introduction of the relatively insoluble sulphonamide drugs, such as sulphaguanidine and succinylsulphathiazole, which are less readily absorbed from the small intestine, has greatly diminished the risks of systemic intoxication.

Sulphaguanidine has been used extensively in the treatment of Flexner dysentery and to a less extent in Shiga, Sonne, and Boyd types of infection. Reports on the efficacy of this drug have varied, though on the whole they have been favourable. Differences have arisen mainly from the adoption of different criteria as an index of bacteriological cure. Anderson and Cruickshank (1941) found, in a series of 41 cases treated during the acute stage and 55 controls, that some mitigation of the symptoms of Flexner dysentery could be brought about by the early administration of sulphaguanidine, and that the subsequent convalescent carrier-rate was about 3 times higher in the controls than in the treated group. Similarly, favourable results were reported by Smith (1944) and Hardy and his colleagues (1942). The latter group of investigators also obtained encouraging results in a small number of cases of Sonne dysentery. Less satisfactory results, however, were obtained by Jamieson and his colleagues (1944), who observed that about a third of their treated cases relapsed during

convalescence. Rantz and Kirby (1942) consider that sulphaguanidine is of doubtful value in both Flexner and *Bact. alkalescens* infections. Osborn and Jones (1944), using the dosage of sulphaguanidine recommended by the Medical Research Council (1943), obtained disappointing results in 71 cases of Sonne dysentery; but they got better results with larger doses.

The evidence for the value of succinylsulphathiazole in the treatment of acute bacillary dysentery and the carrier state is contradictory for the same reasons as for sulphaguanidine. It is generally agreed that this drug is even less toxic than sulphaguanidine; its use, however, has hitherto been restricted owing to short supply. Roberts and Daniels (1943) used succinylsulphathiazole in an epidemic due to the Boyd-88 type; the carrier-rate during convalescence in the control group was 18·2% as opposed to 2·6% in the treated. Brewer (1944) used succinylsulphathiazole in the control of Sonne dysentery and reported favourable results. Fairbrother (1944) however, found both drugs to be ineffective in controlling the convalescent carrier-rate in Sonne dysentery. He took as his criterion of bacteriological cure 12 negative swabs on consecutive days and suggested that any less rigid test tended to lead to unduly favourable reports on the efficacy of these drugs owing to the persistence of small residua in the intestine. Fairbrother further suggests that *Bact. sonnei* may behave in its intestinal habitat in a similar manner to *Streptococcus pyogenes* in the throat, in that it resides in the mucosal crypts, where in time it becomes almost saprophytic. When this state is reached, the organisms become extremely difficult to eradicate, partly because of anatomical inaccessibility and possibly also because of an acquired resistance to sulphonamides.

Our results, however, suggest that the apparent failure in certain circumstances of succinylsulphathiazole to bring about bacteriological cure is due to reinfection. In the series described above, when the 10 patients were treated and allowed to mix freely with their fellows in both schools, most of whom were excreting *Bact. sonnei* in large numbers at the time, 8 became positive again in four weeks. When one whole school was treated, the opportunity for reinfection was less, owing to separate sleeping and dressing accommodation, with the result that far greater success attended the treatment. Further, when the chronic carriers in the control school A were treated and then went home for the holidays, where reinfection was even less likely, they were found to have cleared on their return to school. We feel that the very rigidity of the criteria which Fairbrother prescribed, apart from the difficulty of applying them in civilian practice, must to some extent have vitiated his investigation, since during the time necessary for 12 daily rectal swabs to be obtained from the population under investigation the non-excreters must have been frequently exposed to the risk of reinfection from those who were still excreting the organism.

Both from our own results given here and from the published work reviewed we conclude that, at the time of writing, succinylsulphathiazole presents the best means of eradicating the infection in outbreaks of Sonne dysentery, provided every effort is made to reduce to a minimum the chances of reinfection after the end of treatment. In a school or nursery this can be done only if the resident staff are able and willing to coöperate. A short informal talk to explain the treatment and how it will best succeed is most helpful in this respect.

SUMMARY

An extensive outbreak of Sonne dysentery in two schools in the same building is described.

At first only a limited quantity of succinylsulphathiazole was available, and 10 boys selected from both schools were given 30 g. in 6 one-gramme doses daily for five days. They were not isolated from the other boys, most of whom were at this time heavy carriers. Of the 10 treated cases 8 relapsed in four weeks.

At the height of the epidemic more of the drug became available, and all the boys in one of the schools were treated with succinylsulphathiazole, the other school being left as a control.

In the control school 11 boys out of 33 continued to excrete the organism. In the treated school all 37 boys became negative, except 1 boy who yielded a single positive swab 3 weeks after the course of treatment.

Some of the published work on the sulphonamide treatment of bacillary dysentery is reviewed. It is concluded that reinfection rather than persistence of the causal organism is the explanation of the apparent failures reported by some workers using succinylsulphathiazole to bring about a bacteriological cure.

At the present time succinylsulphathiazole is the best available drug for the control of Sonne dysentery, provided every precaution is taken to avoid reinfection.

Our thanks are due to Dr. T. Lionel Crawhall, the school medical officer, who invited us to investigate the epidemic, and to the staffs of both schools, whose wholehearted coöperation throughout made the investigation possible.

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DENGUE GROUP OF FEVERS IN INDIA

P. V. KARAMCHANDANI
M.B. Bombay, F.R.C.P.E.
LIEUT.-COLONEL I.M.S. (SECONDED I.A.M.C.); MEDICAL SPECIALIST, FEROZEPORE

THE saddle-back temperature and rash characteristic of dengue are not essential to the diagnosis. Of 110 cases seen at Madras (Karamchandani 1937) 54 had a saddle-back temperature and fever lasting on an average just over 5 days; 17 a continuous temperature lasting on an average 7·17 days; and 39 a pyrexia lasting on an average 3·28 days without saddle-back temperature. No eruption was noted in any of these 110 cases.

At Ferozepore in October, 1943, I saw 18 cases, of which 10 had a saddle-back temperature, the fever lasting on an average 4·8 days; 2 had a continued fever; one a short one-phase type of temperature; and one a three-phase saddle-back pyrexia. A profuse macular rubeoloid eruption, very characteristic of dengue, was present in 8 cases.

Whereas classical dengue with saddle-back temperature and a rash may be a distinct disease, several varieties can be distinguished, not only in different epidemics but also in the same epidemic. This is borne out by Dinger and Snijder's experiments, in which mosquitoes infected in Sumatra were brought to Amsterdam and allowed to transmit the disease to volunteers. Although the infection was due to a common virus, various types of fevers were produced in different people (Manson-Bahr 1940).

Although *Ædes ægypti* has now been universally recognised as the vector, *A. albopictus*, *A. tæmorhyncus*, and *Culex fatigans* continue to be suggested as alternatives (Manson-Bahr 1940). I consider that, in Madras at least, *Culex fatigans* is mainly responsible. In Ferozepore no *Ædes ægypti* have as yet been identified in the catches of culicinæ.

From the available evidence I feel that the conception of a dengue group of fevers is justified. I believe that the 5-day fever of Scheer and 7-day fever of Rogers are examples of the same disease. The grouping together of those fevers would focus medical attention on sporadic mild forms of fever which at present are diagnosed either as clinical malaria or as influenza. The question of sandfly fever is more debatable, but there are certain clinical and ætiological similarities between this and the dengue group. Both diseases are transmitted by an insect, the infection being caused by a filtrable virus in the blood-stream. Both are diseases of warm climates and clinically have a short incubation period and a brief rapidly developed fever associated with a slow pulse, leucopenia, and relative decrease of polymorphonuclear

cells. The viruses of dengue and sandfly fever have much in common. The main features of the "dengue group of fevers" would be as follows:

(1) Sudden and abrupt onset, with generalised pains and no local manifestations of an acute inflammatory condition, such as tonsillitis or a septic infection.
(2) Absence of parasites in the blood and absence of leucocytosis—rather a tendency to progressive leucopenia.
(3) Fever with a short self-limited course, the temperature being (*a*) of the saddle-back type, either continuous (average duration 5 days) or interrupted (average duration 5 days); (*b*) continued (average duration 7 days); (c) of the short one-phase type (average duration 3 days); or (*d*) of the larval type (average duration less than a day).

Varieties in the disease are due to differences either in the strains of the virus or in the susceptibility of the patient.

My thanks are due to Colonel B. Schlesinger, consulting physician, N.W. Army and Central Command (Combined), for going through this paper.

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GUNSHOT WOUND OF BOTH ORBITS

REPORT OF A CASE

D. L. CHARTERS
M.B. Glasg., D.O.M.S.
MAJOR R.A.M.C., OPHTHALMIC SPECIALIST

AN American private, aged 36, was wounded by a shell fragment on Oct. 8, 1944, and taken prisoner. He was treated at various German hospitals and reached the British Prisoners-of-war Eye Hospital on Feb. 17, 1945.

On admission I found a healed wound at the outer half of the lower margin of the left orbit. There was a history that the wound had been septic, but the scar, though adherent to bone, was only moderately thickened. The left eyeball was intact, was displaced a little upwards, and moved reasonably freely, except that there was defective movement upwards, apparently due to weakness of the inferior oblique muscle, presumably owing to direct injury. The right eyeball was intact but was proptosed about 7 mm. forwards and a little outwards.

Lateral and anteroposterior views of skull.

The patient complained of double-vision in all directions of the gaze. Vision was 6/24 in each eye. The fundi and media were normal. On radiography (see figure) an irregular foreign body was revealed lodged transversely in the nose and encroaching on both orbits. The foreign body measured approximately 35 × 20 × 3 mm. On the right side it had entered the apex of the orbit in the posterior ethmoidal region. On the left side it lay in the superomedial recess of the maxillary antrum and the inferomedial angle of the orbit.

On Feb. 20, under 'Pentothal' anæsthesia, the nose was explored and the foreign body located and grasped in the left nostril with sinus forceps. An attempt was made to assess its mobility, and it was found to be fixed rigidly. There was a good deal of purulent discharge high up in both nostrils. As I had no anæsthetist and no assistant other than my R.A.M.C. orderlies, I hesitated at first to attempt operation, but this was undertaken on the 28th using at first local anæsthesia (2% procaine) and in the last stages pentothal. Anæsthesia was rendered easier because the foreign body had cut through the infra-orbital nerve. The wound of entrance was excised and extended along the orbital margin, and a large flap was turned down, exposing the maxilla. The antrum was fully opened, and the track of the missile was followed through the roof and medial wall of the antrum. A large opening was made in the medial wall of the antrum to ensure postoperative drainage into the nose. The antrum was filled with mucopurulent discharge. At this stage the left inferolateral corner of the foreign body was exposed and freed until it could be grasped with bullet forceps. It was rigidly fixed but was eventually extracted under the pentothal anæsthesia. The sinus and the area of operation were then soaked in a mixture of 'Albucid Soluble' (30%) and penicillin, and the external wound was closed in layers. Healing took place by first intention, all stitches being out by the 4th day.

A month after operation the patient was liberated by the advancing American 7th Army, and I am out of contact with him. At this time vision in each eye had improved to 6/12, and the proptosis of the right eye was subsiding. There was still diplopia and defective upward movement of the left eye.

I believe this case to be unique because of the size of the foreign body, and the fact that it invaded both orbits without injuring either globe.

Medical Societies

SOCIETY OF MEDICAL OFFICERS OF HEALTH

AT a meeting of the fever group on Nov. 30, 1945, with Dr. M. MITMAN in the chair, a discussion on

Human γ-Globulin

was opened by Mr. B. R. RECORD, PH.D. (Lister Institute). Recognition that the various antibodies present in immune serum are associated with the globulin part of the serum, and indeed for the most part with a particular kind of globulin, has, he said, stimulated research into methods of separating human plasma into its component parts for the better utilisation of their physiological properties. In attempts to fractionate and concentrate the various constituents—particularly the antibody constituents for use in the prophylaxis or treatment of infectious diseases—the ultracentrifuge and the electrophoresis apparatus have been of great value. They make it possible to determine the relative amounts of the several components of plasma with fair accuracy and with little disturbance of their physico-chemical and physiological properties.

In the ultracentrifuge, human plasma shows, broadly speaking, only two sedimenting boundaries, corresponding to a fast-sedimenting component (globulin) and a slower sedimenting component (albumin). In the electrophoresis apparatus, on the other hand, at blood pH, the serum-globulin appears as at least three distinct components, designated—in descending order of mobility—α-, β-, and γ-globulin. Although these different globulins have essentially the same molecular size and shape, and therefore sediment as a single boundary in the ultracentrifuge, they show differences in respect of ionisable groups, which are revealed in differences in their rates of migration in an electric field. For this reason, electrophoresis has become a valuable analytical method in studies on the fractionation of plasma protein. So far, however, it has not been developed for the separation of plasma components on a large scale. During the war Cohn and his co-workers made an extensive study of alcohol fractionation of human plasma, and this method is used in America for the large-scale preparation of various components of human plasma. Most of the antibody activity is associated with the γ-globulin fraction, which has been issued to clinicians.

CLINICAL TRIALS

Dr. WILLIAM GUNN (L.C.C.) said that the clinical use of the various components of human plasma-protein

naturally developed from Cohn's fundamental researches on their separation by high-speed centrifugalisation and electrophoresis and subsequent analysis of their biochemical and immunological characters. The main component, albumin, comprising 55–60% of the protein, was shown to have very high osmotic activity, and in a 25% solution was used on a considerable scale to combat shock among American Service casualties. γ-Globulin represents about 11% of the total protein and contains all the immune substances in the circulating blood; although the amino-acid constitution of this fraction differs appreciably from that of α- and β-globulins and of albumin, attempts to identify and isolate pure antibody and to correlate its immunological properties with chemical constitution have hitherto failed.

γ-Globulin is issued in a specially buffered solution, having a protein content of 16·5 ± 1·5%, in 5 c.cm. ampoules, each representing approximately 125 c.cm. of the parent plasma (from a pool obtained from several thousand donors). It is relatively stable compared with unaltered human serum and can be heated at 57° C. for 4 hours without loss of potency, whereby the agent of homologous serum jaundice is destroyed. Samples of Cohn's original fraction II and several batches of γ-globulin prepared by different United States manufacturers were made available by the courtesy of the American Red Cross for clinical trial in this country.

Preliminary tests suggested that, volume for volume, γ-globulin is about twice as potent against measles as an average pooled convalescent serum. In the protection trials the American dosage recommendation of 0·1 c.cm. per lb. body-weight was followed; this was found sufficient at ages under 1 year and over 5 years, but in 10–15% of cases in the most susceptible age-group, 1–5 years, it did not prevent measles though in nearly all there was moderate to pronounced attenuation of the disease (except in respect of one particular batch). Most of the inoculations were given to home and hospital or nursery measles contacts in and around London and in Glasgow, where the trials, supervised by Dr. T. Anderson, of Knightswood Fever Hospital, gave substantially the same results. Some degree of success for γ-globulin has been claimed by American workers in the prevention of infectious jaundice. In a small uncontrolled series, γ-globulin seemed to protect children against whooping-cough and chickenpox, and Dr. Gunn thinks its use may be extended to the control of all the ordinary infectious diseases. In the treatment of measles its action has been found less certain, but more clear-cut results may be expected from the intravenous administration of the latest preparation which Cohn has recently claimed to be free from risk.

DR. NORMAN D. BEGG (L.C.C.) described a comparative test of γ-globulin and reconstituted dried convalescent measles serum. As modification of attack and not prevention was the aim, dosage was pitched low. Summarising the experience of five outbreaks of measles in whooping-cough wards it appeared that of 22 susceptible contacts injected with 2·5 c.cm. of the convalescent serum 12 developed measles and in only 4 of these was the disease very sharply attenuated, whereas 24 contacts of comparable ages from the same outbreaks injected with 1·2 c.cm. of γ-globulin produced 8 cases of measles of which 6 were much modified. This limited experience suggested that γ-globulin has a measles-antibody content at least twice that of convalescent measles serum, but further experience is necessary to fix dosage more precisely and to adjust it if necessary to body-weight at various ages. With adequate preliminary field testing of individual batches, γ-globulin in doses of 0·1 c.cm. per lb. body-weight seems to give high protection-rates against measles in exposed contacts. The results of treating established measles have been disappointing: one patient who was given 15 c.cm. of γ-globulin intramuscularly when the first Koplik's spots were visible (54 hours before the skin eruption appeared) developed an unmodified attack.

DR. W. H. KELLEHER (L.C.C.) said that in the treatment of poliomyelitis the value of any serum is doubtful. Having abandoned the use of convalescent poliomyelitis serum for this purpose, he decided to try γ-globulin, but in 10 cases given an average of 34 c.cm. the results were entirely negative. Inconclusive results were obtained in treating 2 cases of acute toxic polyneuritis, and no improvement was seen in a case of acute myelitis. Certain poliomyelitis contacts with definite cerebrospinal-fluid changes who were injected with γ-globulin did not develop paralysis, but this was probably without significance. In reply to a question Dr. Kelleher said he has not given γ-globulin intrathecally; there are physiological reasons against antibodies reaching the anterior horn cells from the spinal canal.

DR. H. J. PARISH (Beckenham) thought that the apparent complete failure of γ-globulin in the treatment of measles indicates that its antibody content may not be so high as has been supposed. It would be worth preparing γ-globulin from convalescent measles serum in an attempt to produce a product effective in treatment. He noted with pleasure the statement that the trouble-some jaundice-producing factor is eliminated by the selective heating of γ-globulin.

Reviews of Books

Science and Nutrition

(2nd ed.) A. L. BACHARACH, M.A. Camb., F.R.I.C., with a preface by Sir JACK DRUMMOND, D.SC., F.R.S. London: Watts. Pp. 142. 5s.

THIS book, first published in 1938, deserves its revised and partly rewritten second edition. It can profitably be read, as Sir Jack Drummond says, by the medical man and the politician as well as by the man and woman in the street, for it clearly shows how deficient diets may be at least as dangerous as infective agents. He quotes Brillat-Savarin's aphorism that the destiny of nations depends upon the way in which they nourish themselves. Mr. Bacharach summarises in simple and effective language the results obtained by nutritionists all over the world. Writing primarily as a chemist, he tells us how the nutritionist plans his experiments and evaluates his results. The five chapters on the vitamins give a useful summary of present-day views, and the book should relieve the general reader of much of the worry about his eating and drinking which his other reading may engender. Mr. Bacharach appears, however, to believe that, if the majority of the world's workers are given more money, or if the prices of foods are reduced, people will buy enough of the right kinds of food. Against this the U.S. National Research Council's committee on food habits has shown that food habits are not conditioned by economic factors alone. Any effort to change them must reckon also with social, psychological, religious, and other factors. Moreover, to provide the means of obtaining an optimal diet is not to ensure that it is actually eaten. One method of seeing that it is eaten is to remove all temptation and ability to buy the unbalanced diet—which is in effect what Britain did during the recent war. All things considered, however, we may come to prefer the slower but ultimately more effective process of education. For those who are willing to learn what they should eat, and why, Mr. Bacharach supplies helpful information.

A Study of Endometriosis

(2nd ed.) JAMES ROBERT GOODALL, M.D., D.SC., F.R.C.O.G., formerly professor of clinical gynæcology and obstetrics, McGill Univ., Montreal. London: Lippincott. Pp. 150. 35s.

THIS book has been written to bring the whole subject of endometriosis and allied diseases under one cover, and to add several new chapters on new work. So writes Professor Goodall in his preface, and thereby gives a brief description of his life's work. He is an enthusiast, and when in addition we know him to be a gynæcologist of experience, no mean clinician, an expert pathologist, an accurate observer, and a man with imagination, it is not surprising that he should produce a remarkable work. The reviewer of scientific books seldom has difficulty in laying them down, but some of the chapters in this one are so stimulating that they must be pursued to the end. A far wider field is covered than is suggested suggested in the modest title. The author indicates yet another approach to research into the causation of innocent and malignant new growths. His book will be of interest to all, but especially to the pathologist and gynæcologist. Much written therein will be disputed and more still will be criticised. But even if future investigations do not confirm some details of Professor Goodall's work, his ideas may lead to important discoveries.

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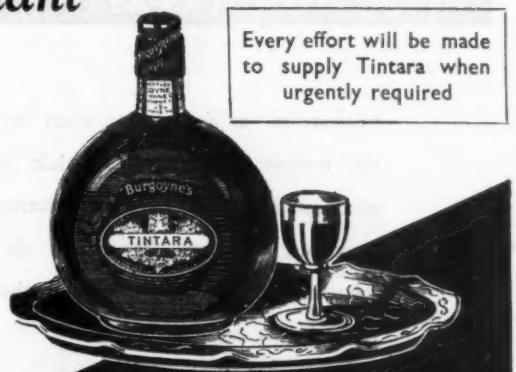

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THE LANCET

LONDON: SATURDAY, JANUARY 19, 1946

Bombs on Germany

TOWARDS the end of the war the air attack on Germany came to be regarded by some as a background, if not as a subsidiary, to the land and sea campaigns. Its magnitude is emphasised by an official American account[1] of its effect on the health and medical care of the Germans. Whereas fewer than 61,000 people were killed in German air attacks on Britain, the Allied air-raids caused over half a million deaths in Germany—about as many as Britain and the British Empire sustained on all fronts in the whole war. In Hamburg during a single month (July, 1943) between 46,000 and 60,000 people were killed, which is considerably more than twice the number killed in the London county area in 1939–45. In the chaos of defeat, exact figures are unobtainable; records have been lost, and numberless bodies remain, unidentified, beneath the ruins of German cities. The chief causes of death, as might be expected, were direct hits by bombs or bomb fragments, burial under rubble, and fire; and the report places the main emphasis on fire. In incendiary raids burns were a less common cause than the inhalation of superheated air or poisoning by carbon monoxide, which is said to have accounted for as many as 80% of deaths in some raids. Engineers in Hamburg have estimated that the temperature in burning blocks rose as high as 800° C. (nearly 1500° F.). When the heat became intense, hundreds of people were seen emerging from shelters; they ran across the road and slowly collapsed as if utterly exhausted. Many who died in this way were afterwards found naked except for their shoes—either because flames suddenly spurted across the street and consumed the victims' clothing, or because the intense heat caused the clothes to dissolve without actual fire. Most of the bodies were not burned to ashes, but were dry and shrunken like mummies.

Considering the disruption of normal life in the cities, the people's health remained surprisingly good. Overcrowding, and recurrent damage to the water and sewage systems, are thought to have increased streptococcal infections, paratyphoid, diphtheria, and scabies; and in a series of bombed cities, selected as representative, the incidence of tuberculosis rose from 133 to 207 per 100,000 between 1933 and 1944. Yet though deficient sanitation, overcrowding, and fatigue may seem to have set the stage for widespread epidemics, there were none. The report suggests that their absence may be largely attributable to the Germans' devotion to personal hygiene; they have succeeded in keeping cellars and hovels clean and orderly in the midst of ruins untouched since the raids. Most German doctors have said that the raids did not lead to an increase in psychiatric illness. Though no authoritative statement has yet been made on the morale of civilians in the exposed cities, it appears that the people accepted their lot with little argument, for we have heard nothing of large disturbances or disorganised flights. It would surely be profitable to investigate the causes of this complaisance: what parts were played by belief in final victory, good discipline, fear, or apathy? It seems that casualties in war plants were no more frequent than among the general population; in fact, as attacks increased, a smaller proportion of people were killed at work. But the attacks did directly affect the industrial worker's health: they gave rise to irritability, nervousness, and deficient concentration, which in turn raised the accident-rate, and there was much upper-respiratory infection and some increase in pyogenic infections owing to employment under insanitary conditions. Absenteeism after raids was checked by rigorous measures.

During the war the German doctors had to do about twice as much work as in peace-time. In November, 1944, approximately 47,000 were serving a population of 66 million in Germany proper. Already before the war hospital facilities were antiquated and barely sufficient, and about a third of the hospitals in cities have since been destroyed. The damage to hospital buildings varied more or less with the importance as targets of the cities in which they stood. The quality of medical care in hospital was fairly well maintained, and by careful control of raw materials medical supplies were adequate till the last year of the war, when many drugs, including the sulphonamides and insulin, became scarce. The production of penicillin, of which the process was known, had reached only the experimental stage when it had to be abandoned; but it is stated that medical research was not impeded till the final year. As the end approached, the surgeon fared little better than the physician: instruments were hard to obtain; owing to shortage of textiles, moss was sometimes used as an absorbent dressing on wounds; and paper bandages were widely employed. Drug manufacture was concentrated in Berlin, Hamburg, and cities of the Ruhr and Rhineland; textiles were made mainly in Silesia, and glass in Thuringia. Thus the pharmaceutical industry was particularly vulnerable to Allied air attack on the transport system. The organisation was so highly integrated that a raid on one factory would often stop production in others by depriving them of essential materials. Except for the allocation of raw materials, medical supplies were not controlled until the phase of intensive attack started, and manufacturers attributed the final failure of supplies to neglect to arrange sufficiently early the control, dispersal, and rationing of stores, and the simplification of equipment and drugs, which were eventually needed. Last April it was reported to HITLER that 20% of all essential medical supplies had been destroyed; that 40% of those in stock were partially damaged and would last two months; and that the remainder would maintain the supply for four additional months if transportation could be restored. It is believed that, had the bombing continued for a few more months, German doctors could not have rendered the barest essentials of medical care, epidemics would have ensued, and the people would have been brought to the verge of starvation.

Seeking for lessons in the German experience, the

1. Report issued in Washington by the medical branch of the United States Strategic Bombing Survey, headed by Major Cortez F. Enloe, Jr., chief of the Army Medical Sciences Branch. Summary issued by U.S. Information Service, Inveresk House, Strand, London, W.C.2.

report notes that unified direction of military and civilian health services proved necessary to assure medical care for the armed forces and the general public. Scrupulous personal hygiene did much to protect civilians from ill health. The ability of hospitals to maintain their function in the face of air-raids depended on their being distant from important targets, and independent of all outside sources for essentials such as lighting, food, and water, as well as on the protection they could offer patients.

Streptomycin

OF all the antibiotics so far discovered, streptomycin, isolated in 1944 by the American workers WAKSMAN, BUGIE, and SCHATZ,[1] promises after penicillin to be the most important. Combining low toxicity with a pronounced bactericidal action over a wide range of pathogenic bacteria, it gave every hope of being successful in infections caused by organisms insensitive to penicillin. In experimental studies on mice[2] infected with gram-positive or gram-negative bacteria, and on guineapigs infected with tubercle bacilli,[3] streptomycin showed clear evidence of chemotherapeutic activity in all cases. In the mouse experiments 100% recovery was obtained after inoculation with lethal doses of gram-negative bacilli, provided that sufficiently large amounts of streptomycin were administered. Equally impressive results were obtained in the guineapig experiments, inasmuch as there was little evidence of tuberculous disease developing after inoculation with human strains; nevertheless tubercle bacilli were subsequently recovered from the spleens of some of the animals treated with streptomycin. The results were comparable to those previously obtained in the treatment of guineapig tuberculosis with sulphone compounds such as promin.

It is therefore disappointing that in the few clinical trials yet reported streptomycin has not proved so successful as might have been expected. In the first clinical study, published by REIMAN, ELIAS, and PRICE,[4] very large amounts of the drug—as much as 4 million units[5] (10 g.)—were given each day parenterally for 7–12 days in five cases of typhoid fever. In two cases fever ended abruptly some days after the treatment began, and recovery followed in a manner which strongly suggested that the drug was responsible; in a third case there was a gradual decline in fever with recovery; in the fourth there was partial recovery followed by relapse when the drug was stopped; while in the fifth the drug exerted no appreciable effect. More recently HINSHAW and FELDMAN[6] have issued a preliminary report on the treatment of human tuberculosis with streptomycin at the Mayo Clinic. The drug did not seem to affect the lesions of chronic fibrocaseous tuberculosis, but extensive and progressive lung lesions tended to improve while the drug was being given, although cessation of treatment was in a few cases followed by renewed activity in the lesions. More encouraging results were obtained in renal and cutaneous tuberculosis, but too short a period had elapsed since the end of treatment for a final assessment.

Streptomycin is poorly absorbed from the gastro-intestinal tract, but intramuscular and intravenous injections are well tolerated and the drug is excreted less rapidly than penicillin. The greater part of it is excreted in the urine, and a concentration as high as 1330 units per c.cm. can be maintained by the parenteral injection of 2,000,000 units daily.[7] A concentration of 100 units per c.cm. should, in HELMHOLZ'S view, rapidly reduce the number of bacteria found in urinary infections, and the drug has been widely employed in America for the treatment of urinary-tract infections following cord lesions in Army personnel. No reports are yet available, but it is believed that the results are not entirely satisfactory. The drug is not devoid of toxicity to man, and HINSHAW and FELDMAN have reported one case of deafness and three cases of apparent damage to the vestibular nerve when streptomycin was administered for long periods. Streptomycin fails to pass the blood-brain barrier, but it can be administered intrathecally. When used in this country in cases of meningitis caused by gram-negative bacilli such as *Pseudomonas pyocyanea* the results were disappointing, although apparently adequate levels were maintained in the cerebrospinal pathways.

At the moment streptomycin is issued only for clinical trials, which are for the most part being carried out in America. In view of its large and somewhat unusual molecule it is unlikely to be synthesised in the immediate future; but, as it is easy to produce, some should soon be available in Britain.

Exploration of Muscle

BERNAL[8] has pointed out that the methods of investigating muscular contraction are so specialised that researchers in this field scarcely know what their fellows employing a different approach are doing. From time to time, however, the hypotheses suggested by one line of attack overlap fact as discovered by another, and where these are incompatible some mutual adjustment takes place. Microscopic analysis, with its sarcomeres and transverse membranes, and elaborate explanations of their changed relationships during contraction, has given way to the combined subtle verdict of the X ray and the robust fact of the chemist. The chemist says there is virtually nothing available but myosin out of which muscle fibrils can be made (though SZENT-GYÖRGYI[9] has found another fibre-protein, actin), and the X rays reveal that molecules of myosin can arrange themselves in chains which fit in very well with the X-ray appearance of actual muscle. The dark and light cross-striations, representing doubly and singly refracting segments of the fibrils, must mean that for a space the molecules are strung together in one way and then for a space in another way. Or perhaps the strings themselves are zigzagged, single or double refraction depending on

1. Waksman, S. A., Bugie, E., Schatz, A. *Proc. Mayo Clin.* 1944, **19**, 537.
2. Jones, D., Metzger, H. J., Schatz, A., Waksman, S. A. *Science*, 1944, **100**, 103. Heilman, F. R. *Proc. Mayo Clin.* 1944, **19**, 553. Robinson, H. J., Smith, D. G., Graessle, O. E. *Proc. Soc. exp. Biol. N.Y.* 1944, **57**, 226. Heilman, F. R. *Proc. Mayo Clin.* 1945, **20**, 33.
3. Feldman, W. H., Hinshaw, H. C. *Ibid*, 1944, **19**, 593.
4. Reiman, H. A., Elias, W. F., Price, A. H. *J. Amer. med. Ass.* 1945, **128**, 175.
5. The unit originally described by investigators at Rutgers University was that quantity of the dry streptomycin which would inhibit the growth of a given strain of *Bact. coli* in 1 c.cm. of nutrient broth or agar. Subsequent workers have adopted different but substantially equivalent standards.
6. Hinshaw, H. C., Feldman, W. H. *Proc. Mayo Clin.* 1945, **20**, 313.
7. Helmholz, H. F. *Ibid.* p. 357.
8. Bernal, J. D. Perspectives in Biochemistry, Cambridge, 1938.
9. Szent-Györgyi, A. *Bull. Soc. Chim. biol.* 1943, **25**, 242.

the consequent orientation of the molecules with respect to the direction of the transmitted light. The undoubted coincidence of level between the dark and light bands in adjacent fibrils argues more than a conglomeration of simple molecular chains. Similarly strung molecules are joined laterally by side-chains, and probably the shape of the grids so formed is such that they fit together like a stack of spoons.

Contraction clearly involves some kind of almost instantaneous change in the shape of the molecules. They may, for instance, have a tendency on account of attraction between their own side-chains to curl up into rings, and yet normally be held out straight by the electrostatic field of the solutes surrounding them. Transformations of these solutes, which we dimly apprehend through the multitude of chemical changes[10] accompanying contraction, might change the electric field and permit the necessary change in shape. BINKLEY,[11] of the U.S. Naval Research Unit, suggests a more purely chemical explanation in which sulphydryl and hydroxyl groups on adjacent amino-acids condense to make a ring and shorten the molecule. The groups are ordinarily held apart by combination of the hydroxyl group with phosphate, which during contraction is removed to form adenosine triphosphate (A.T.P.). There is, however, some difference of opinion as to whether A.T.P. appears during the actual contraction or the subsequent relaxation,[12 9] while ASTBURY [13] associates the sulphur side-chains with the links between the main chains, and suggests that they may be temporarily ruptured during contraction. He postulates other, and superficially more attractive, types of ring formation to account for the actual shortening. Advances in X-ray diffraction studies [14] of muscle under the influence of various reagents must soon solve some of the structural problems. Meanwhile, SINGH [15] points out that since the condition of the molecular chains can be altered by their chemical environment, the capacity of smooth muscle to increase its tone with no increase in oxygen consumption may mean that its myosin is contracted by a more permanent " reagent " than the presumably labile ones which activate voluntary muscle and which require energy for their production or dissipation.

Another hypothesis which has been set up to tempt the specialist is a theory of the nervous initiation of contraction—the trigger without which voluntary muscle remains inert. Whatever the nature of the equilibria which determine relaxation and contraction, each nerve impulse switches its quota of fibrils from one to the other. In life, all muscles are in a state of " tone," [16] which means that the myosin molecules of every voluntary muscle fibril are all the time being switched open and shut several times a second. The muscle may not have time to relax completely between the impulses, and if these are more frequent than about 60 per second it remains fully contracted. The question arises whether the change in equilibrium is touched off by the establishment of an electrical potential around the nerve-ending or by the appearance there of a chemical substance. In the opinion of ECCLES,[17] chemical transmission becomes less important as we pass from autonomic effector organs to voluntary muscle, sympathetic ganglia, and central synapses. The excitation in sympathetic ganglia set up by stimulating preganglionic fibres is signalised by compound electrical potentials for which acetylcholine is partly responsible : its share in ganglionic transmission—a minor one—is defined.[18] In his hypothesis on the activation of voluntary muscle, ECCLES is concerned solely with a detailed picture of how the electrical phenomena accompanying the nerve impulse may set up electrical potentials in the adjacent part of the muscle-fibre intense enough to start a propagated wave of contraction. The avowed object of the hypothesis is that it offers a description of " electrical transmission " sufficiently definite to be tested. One of the most important results of the tests will be an evaluation (as in the sympathetic ganglion) of the part played by acetylcholine. It seems to be anticipated that this will have something to do with deciding the sensitiveness of the end-plate or neighbouring parts of the fibre to the fundamental electrical excitatory process. It will be recalled that the exposure of voluntary muscle to acetylcholine, if sufficiently intimate, will cause it to contract in the absence of nerve impulses,[19] and the action of drugs preventing the destruction of acetylcholine, such as ' Prostigmin,' is clinically well established. It is not too much to hope that in the near future we may see a reconciliation between various schools of thought on nerve-muscle physiology with the emergence of a story which, at all events in outline, can be understood by the comparative layman.

10. See Lovatt Evans, Starling's Principles of Human Physiology, London, 1945.
11. Binkley, F. *Science*, 1945, **102**, 477.
12. Sandow, A. *Trans. N.Y. Acad. Sci.* 1945, **7**, 139.
13. Astbury, W. T. *Trans. Faraday Soc.* 1938, **34**, 378.
14. Spiegel-Adolph, M., Henny, G. C., Ashkenaz, E. W. *J. gen. Physiol.* 1944, **28**, 151.
15. Singh, I. *Nature, Lond.* 1943, **152**, 132.
16. Sherrington, C. S. *Brit. med. J.* 1931, i, 207.
17. Eccles, J. C. *Nature, Lond.* 1945, **156**, 680.
18. Eccles, J. C. *J. Physiol.* 1944, **103**, 27.
19. Brown, G. L. *Ibid*, 1937, **89**, 12P.

Fresh Air in Railway Carriages

THE cheerful tone of our peripatetic correspondent who appeals this week for better ventilation in railway carriages may obscure the seriousness of his plea. No-one who travels, either regularly or occasionally, in the trains which carry Londoners to and from their work can doubt that the ordinary railway compartment, especially in its present overcrowded state, provides all the circumstances which the catarrhal organisms require to spread airborne infection, and is a main source of the minor illness that impairs efficiency and happiness for so many throughout the winter. The remedy is to hand—coaches of the all-one-compartment variety properly air-conditioned, warmed, and perhaps disinfected by aerosol or other methods. But the railway companies are in some respects conservative, and will almost certainly be replacing their outworn passenger coaches with ones of similar design unless a determined demand from their customers moves them to put considerations of health before tradition.

Air Vice-Marshal ANDREW GRANT has been appointed director-general of the Royal Air Force medical service in succession to Air-Marshal Sir HAROLD WHITTINGHAM who retires on Feb. 28.

THE next session of the General Medical Council will open on Tuesday, Feb. 12, at 2 P.M., when Sir Herbert Eason, the president will take the chair.

Annotations

CHEMICAL WARFARE RESEARCH IN U.S.A.

THE remarkable British achievement of the discovery and development of B.A.L. (British anti-lewisite)[1] is far from being the only contribution to fundamental medical knowledge which has arisen from the study of chemical agents of warfare. As long ago as June, 1941—six months before Pearl Harbour—President Roosevelt set up a research organisation whose work, now summarised within the restrictions of the secret list by Oscar Bodansky,[2] has thrown new light on the action of the mustard group of compounds, lewisite, phosgene, the cyanides, and a new compound which inhibits the activity of cholesterinase.

The development of the nitrogen mustards since the first world war made it necessary to study their systemic and vesicant effects. Even very small amounts of them cause liquefaction necrosis of the cells of the lower layers of the epidermis, with exudation of fluid and the formation of intra-epidermal vesicles. A rational basis for the treatment of these was sought by studying the interactions between nitrogen mustards and various amino-acids and proteins, their action in vitro and in vivo on various enzyme systems, and the "mechanisms" of their skin penetration and effects on cell structures. As in the work which resulted in the discovery of B.A.L., the approach was fundamental rather than empirical. Although the treatment of mustard lesions suggested by these studies was less successful than the corresponding treatment devised for lewisite lesions, the basic biochemical knowledge obtained should be valuable to dermatologists and others concerned with vesication. The studies made of the effects of both the mustards and lewisite on the tissues of the eye should be especially valuable.

Another promising line of inquiry was opened by the British study of a group of compounds originally described by German chemists in 1932. At the laboratory set up in 1943 at Edgwood Arsenal, U.S.A., it was found that one of those compounds decreases the activity of cholesterinase in tissues and the blood. The symptoms which resulted when men and animals were exposed to low concentrations of this compound were not, with the exception of the miosis from which all the subjects suffered, serious; there was a feeling of constriction of the chest and a few subjects had rhinorrhœa, salivation, and diarrhœa. The serum cholesterinase, however, fell to about 1–5% of its normal value and Bodansky regards this degree of inhibition of a body enzyme as unprecedented. The return to normal was slow; in four days it reached about 30% of the normal, in eight days 50%, and in fifteen days about 70%. This protracted inhibition of cholesterinase suggested the use of the compound for the treatment of conditions such as myasthenia gravis in which a deficiency of acetylcholine at the myoneural junctions has been postulated. 'Prostigmin' is given for myasthenia gravis because it inhibits cholesterinase activity at the myoneural junctions and thus permits the accumulation there of acetylcholine with a resultant increase of muscular strength; but prostigmin must be given fairly often and it is hoped that the new compound will have a longer effect. It may also prove useful in glaucoma. Both these lines of investigation are being pursued in the United States.

The study of the effects of phosgene led to a detailed study of the mechanism by which it increases the permeability of the alveolar membranes of the lung; and the value of oxygen therapy has also been examined. Experiments showed that oxygen reduced the mortality from phosgene poisoning, and apparatus incorporating the army gas-mask face-piece was devised for the simultaneous administration of oxygen to 20 men. Finally, Bodansky describes the work done on the treatment of cyanide poisoning with nitrites. The nitrites (inhalation of amyl nitrite or intravenous injection of sodium nitrite and sodium thiosulphate) act by forming methæmoglobin in the blood, and there is evidence that this compound competes for the cyanide ion with the respiratory pigment ferricytochrome oxidase. The United States workers therefore inquired whether the deliberate production of methæmoglobinæmia, combined with the use of a gas-mask, would not protect the soldier against cyanide gases used in warfare. Substances were sought which would produce methæmoglobinæmia without other physiological effects and one compound was discovered which seemed to be suitable. This was used to produce methæmoglobinæmia in man and animals and studies were then made of the blood chemistry, the oxygen-dissociation characteristics of the blood, the capacity for work, and the effects on dark-adaptation and on the hæmopoietic, liver, and kidney functions. The levels of methæmoglobinæmia which are either embarrassing or fatal to animals were determined. The clinical applications of this knowledge are apparent when it is remembered that methæmoglobinæmia results from the administration of certain drugs and from the absorption of some toxic materials in industry. There are also cases of familial idiopathic methæmoglobinæmia.

These studies of cyanide poisoning may prove to have another valuable application. In 1918 Loevenhart reported that cyanide given to a schizophrenic patient caused a brief return to normal mental processes. Other work, and also the knowledge that the lethal effect of cyanides depends on their effect on the central nervous system, led the American workers to study the metabolism of brain tissue. The possibility of treating schizophrenia with cyanides is being followed up at various centres in the United States.

1. See leading article, *Lancet*, 1945, ii, 854.
2. *Science*, 1945, **102**, 517.

BONE-FORMATION IN APICAL LUNG SCARS

THE apical portion of the lung half concealed by the clavicle has a literature of its own. Clinicians exercising the art of auscultation and light percussion, radiologists pursuing an elusive shadow, and the morbid anatomists seeking the cause of adhesions have all found this region an interesting but frustrating study. Lately Davson[1] has been studying bone-formation in apical scars to determine whether these anthracotic subpleural apical pulmonary scars commonly found at autopsy are really the result of tuberculosis as many morbid anatomists in the past have assumed. The material for the investigation was derived from 130 nearly consecutive autopsies performed at the Manchester Royal Infirmary. As a result of careful microscopical examination Davson groups these scars into two classes—type A, in which definite evidence of tuberculosis is lacking, and type B, which present some evidence of tuberculosis.

From the 130 autopsies studied Davson obtained 14 type-A and 16 type-B scars. In type-A scars the essential histological features were fibrosis with varying accumulations of carbon and siliceous dust and a proliferated elastic fibre network within the area of the scar corresponding in outline with the original alveolar elastic network of the lung. In 12 of these scars, although there was no naked-eye evidence of them, microscopical examination revealed calcified foci and in some cases ossification. The structure was commonly that of woven bone, but where central bone-marrow formation had occurred lamellar bone could be seen in close relation to the marrow spaces. There was no definite evidence of osteoclastic resorption or calcified fibrous tissue, and it was not clear how the scar tissue had become converted into bone. In the type-B scars the striking point was the appearance of small hard pale yellow foci surrounded by well-defined greyish

1. Davson, J. *J. Path. Bact.* 1945, **57**, 171.

rings of fibrous tissue which were again surrounded by pigment. Microscopically these yellow foci consisted of central masses of calcified necrotic tissue with a collagen fibre capsule which clearly divided the calcified mass from the rest of the lung tissue. Bone-formation, when it occurred, was usually of the lamellar type.

As a result of these intensive studies Davson summarises the differences between type-A (non-tuberculous) and type-B (tuberculous) scars as follows. Areas of calcification and ossification are usually recognisable macroscopically in type B scars but only microscopically in type A. Calcification in type B primarily involves a necrotic mass, whereas there is no obvious necrosis in type A, in which calcification occurs in small regular deposits. Bone-formation in type B begins at the periphery of the main calcified mass; in type A it is haphazard and may develop without previous calcification of fibrous tissue. The elastic mass network is fragmentary or absent in type-B areas of calcification or bone, whereas in type A this elastic network is intact and can be demonstrated within the area of calcification or ossification in direct continuity with the network outside. Davson also emphasises that osteoclastic resorption of a calcified matrix precedes bone-formation in type-B scars, whereas this is not so in type A. From Davson's present paper it is not easy to see why he assumes that one group of scars is tuberculous and the other is not; it would help if he would tell us whether there were further signs of healed tuberculosis in the lungs or elsewhere in the body.

A DIFFERENT KIND OF MATRON

MATRONS have always suffered under a double burden of responsibility and a divided loyalty. They have had to look after the well-being of both patients and nurses, and to combine the demands of nursing education with the need for getting the work done. Apart from the care of patients, the matron of a big teaching hospital with its hundreds of nurses carries an administrative and educational responsibility not less than that of a head of a women's college in a university. The Royal Victoria Infirmary, Newcastle-on-Tyne, has lately advertised the post of matron in unusual terms. The house committee wish the appointment to "offer new opportunities to someone who is anxious to advance nursing practice and nursing education, and for these purposes have arranged to relieve the matron of all duties within the hospital other than those directly related to nursing." They are asking for applications from a wide field, even from among those whose nursing experience is not recent, and from those with medical and other academic qualifications. The new matron is to have adequate technical, educational, and secretarial staff, and will be encouraged to "study in practice and by inquiry the needs of the patient on the one hand and the needs of the nurses on the other, so that new methods and standards of nursing may be kept constantly in mind throughout the hospital." She is to be given the opportunity to travel, and to keep abreast of modern advances in nursing and of educational methods in other fields.

This farsighted proposal has not excited unmixed enthusiasm from the nursing profession; there have been hints of a threat to the status of the hospital as a training school if a matron who is not a nurse should be appointed. The *Nursing Mirror*, however, with characteristic liberality, recalls that Florence Nightingale was not a trained nurse, and suggests that the answer to the question whether someone other than a trained nurse could make a success of a matronship such as this depends upon the woman. The infirmary committee do not imply that they intend to employ anyone who is not a nurse, and it may well be that many suitable candidates from the nursing profession will apply; but clearly if the experiment is to succeed the matron chosen must be the best person for the job, whether she is a nurse or not. The sympathy of THE LANCET with the nursing profession has never we hope been in doubt, and it would be to the credit of British nursing in our opinion if the right nurse could be found for the post. It is perhaps a weakness to be unwilling to learn from others outside our own profession—a weakness which it must be admitted doctors share. Nevertheless, it may be that nurses, like doctors, by the highly specialised nature of their training, are not necessarily the best people to master their own educational problems. To be accessible to new ideas is a sign of strength not of weakness. Some time ago we proposed that the Ministry of Health might send expert nursing teams to outlying hospitals to demonstrate modern nursing techniques. The comment of some senior nurses on this proposal was: "The sisters will never stand it; I shouldn't care to have strangers coming into my wards to demonstrate to me." May we suggest in a friendly way that this rejection of new opportunities can be stultifying? We hope that the nursing profession will see the Newcastle advertisement not as an attack on their unity but as the opportunity for a great nursing advance.

"CARBON 13"

ALTHOUGH it is customary to think of carbon as having an atomic weight of 12, it is now known that this element may be obtained in the form of at least five isotopes of atomic weights 10, 11, 12, 13, and 14. Only two of these, C^{12} and C^{13}, occur naturally; the others must be prepared artificially. Ordinary carbon, as it occurs in nature as the free element or in the form of its inorganic or organic compounds, consists of a mixture of 98·9% C^{12} and 1·1% C^{13}, and methods have now been devised in America for concentrating heavy carbon (C^{13}) and making it available for biological and medical research. One of the most important purposes for which it can be employed is to follow the steps by which one carbon compound is converted into another—e.g. the stages by which glycogen is built up in the tissues or by which fatty acids are broken down. To do this, substances containing a high concentration of C^{13} are synthesised for administration to animals or to human subjects, and the concentration of C^{13} in the possible products of intermediary metabolism, subsequently isolated from the tissues or excretions, is determined with the aid of the mass spectrograph. C^{13} can thus be used as a marker to label carbon compounds in the same way as the nitrogen isotope N^{15} is used to label amino-acids and proteins. By employing CO_2 labelled with heavy carbon it can be shown for example that urea can be formed in the tissues directly by the interaction of carbon dioxide and ammonia.

C^{13} has recently been used in investigating the mode of formation of the ketone bodies.[1] When octanoic acid containing C^{13} in the carboxyl group, $CH_3CH_2CH_2CH_2CH_2CH_2CH_2C^{13}OOH$, was incubated with liver slices, the acetoacetic acid subsequently isolated contained the labelled carbon equally distributed between the carbonyl and the carboxyl groups thus, $CH_3C^{13}OCH_2C^{13}OOH$. Such a compound could not be formed by direct oxidation of the octanoic acid, and it has therefore been suggested that the ketone bodies are formed by condensation of small units each containing two carbon atoms. To confirm this view, labelled acetic acid, $CH_3C^{13}OOH$, was incubated with kidney slices and the acetoacetic acid formed was found to be labelled in the carbonyl and carboxyl groups, showing that it had been produced by condensation of two acetic acid molecules.[2]

Of the radioactive isotopes of carbon, C^{10} has a half-life of only 8·8 seconds and is therefore of little use as a tracer, but C^{11} with a half-life of 21 minutes has been

1. Weinhouse, S., Medes, G., Floyd, N. F. *J. biol. Chem.* 1944, **155**, 143.
2. *Ibid.* 1945, **157**, 751.

employed in short-term experiments on respiration. The most important radioactive isotope, however, is C^{14} which is formed when C^{13} is bombarded with neutrons in a cyclotron. It has a half-life of 1000 years and shows promise of being even more important than C^{13} as a marker for following the changes undergone by carbon compounds in the tissues. It has already been employed to demonstrate that the carbon of glycogen may be derived from sodium bicarbonate, butyric acid, propionic acid, and glycine.

LONDON PRIDE

IN his interim report [1] on the health of London, briefly summarised in our last issue, Sir Allen Daley pays a well-earned tribute to the courage and devotion to duty throughout the war of the staffs of the medical, nursing, and auxiliary services of the L.C.C.; but even to English eyes his opening sentence must seem somewhat of an understatement. "Nineteen hundred and forty-four," he says, "was a trying year for Londoners." For the ordinary citizen, 1944, the culminating year of a series of hard war years, was perhaps rather more than trying. It needs little imagination to appreciate how much trial of mind and body was entailed in the destruction of 29·7% of the homes of East London. It is all tabulated in the report with cool precision—air-raid casualties for each war year, grouped sadly but inevitably from age 0–1 on. Yet in the same columns of figures is told a story of confidence in their individual and national future of which any Londoner may well feel proud.

From the wealth of statistical data presented in Daley's report, some of the salient features have been collected in tables I and II. The most striking measure of the stress of war is given in the first column by the air-raid death-rate. The remaining columns must be reviewed against the background which it provides. The resilience of morale should be gauged less by the rising marriage-rate of the early war years than by the willingness to have children even in adverse circumstances which is reflected in the rising birth-rate. This apparent confidence in the future was also evident in the rising birth-rate among the occupied countries of Europe, in contrast to the opposite trend in the first world war. Significantly enough, the major exceptions to this upward trend in 1944 were Germany and Hungary. The corollary of this index of morale is seen in the steady fall in the suicide-rate during the same period.

TABLE I—RATES PER 1000 PER ANNUM

Year	Air-raid deaths	Marriages	Births	Suicides
1939	0·00	27·1	13·0	0·15
1940	2·59	34·5	15·0	0·17
1941	2·00	30·2	14·6	0·12
1942	0·04	27·6	16·9	0·12
1943	0·21	21·7	18·0	0·10
1944	1·85	21·5	18·1	0·10

As would be expected, however, the health of Londoners was not left unscathed by the effects of war. The indication of social wellbeing given by the pre-war fall in infant mortality has registered a check. In 1941, "the winter of our discontent," it reached a maximum of 57 per 1000 live births. This was the result, at least in part, of the malnutrition and overwork which raised the tuberculosis-rate and the overcrowding which caused a parallel move in the incidence of cerebrospinal fever. As table II shows, all three are now diminishing in satisfactory unison. The one discordant ominous note is sounded by the continued persistent rise in mortality of young children from diarrhœa and enteritis. In 1944 enteritis was three times more dangerous to infant life than whooping-cough, its nearest competitor.

TABLE II

Year	Infant mortality*	Deaths from pulmonary tuberculosis †	Cerebro-spinal fever notifications	Deaths from diarrhœa and enteritis (ages 0–2)†
1939	47	0·70	0·04	8·4
1940	48	0·87	0·27	6·1
1941	57	1·10	0·30	6·3
1942	50	0·90	0·14	8·0
1943	51	0·88	0·09	9·9
1944	51	0·84	0·08	9·6

* Deaths per 1000 live births.
† Deaths per 1000 per annum.

Comparisons are admittedly odious, and international comparisons of vital statistics notoriously so; yet the contrast with the New York experience cited in the report re-emphasises the need for the research now to be undertaken by the medical staff of the L.C.C. The consistent rise in the later stages of the war and the high incidence in areas which have borne the brunt of air warfare under conditions which even before the war could hardly be described as salubrious, suggest the cumulative effect of adverse factors affecting the environmental hygiene of the London infant. Perhaps these factors are not the major social evils which underlie tuberculosis and the air-borne infections. It is more likely that they are the multitudinous minor ills which harass the wartime mother, often both housewife and worker, and make the care of her children so much more difficult. If, however, these factors can be isolated and dealt with in the spirit which was displayed in war, London will certainly have another legitimate reason for pride.

THE NATIONAL HEALTH SERVICE

LAST week the Minister of Health met the Negotiating Committee which represents the principal medical organisations, and gave the members an outline of his proposals for a National Health Service. He is meeting the committee again, and is also putting his plans before spokesmen of the local authorities, voluntary hospitals, dentists, pharmacists, and others concerned. On another page our correspondent "Medicus, M.P." suggests that the new National Health Service may come into being in 1948, and discusses some of the problems that will arise in the meantime.

Prof. F. E. TYLECOTE, F.R.C.P., has been appointed chairman of the public health committee of the Association of Municipal Corporations in succession to Sir George Martin.

"... Any educated man could understand Lyell's *Principles of Geology* or Darwin's *Origin of Species*. Modern innovations in science on the other hand appear in works that only experts can follow. Poetry and music, no less than painting and natural science, make increasing demands upon those who seek to understand them; one may regret the fact, as Mrs. Partington regretted the Atlantic, but it is useless to follow her example and deny it. It is not Lord Keynes's fault that only experts can read his great book; his command of language is not inferior to John Stuart Mill's, but what he has to say is far more complicated. The chief moral to be drawn is that the world is very full of things that are very difficult to understand; and that if we do not understand something it is sensible either to try to learn or to keep quiet."—ROGER MARVELL, *New Statesman*, Jan. 5, 1946, p. 7.

1. Interim report of the County Medical Officer of Health and School Medical officer for the year 1944. Published by the L.C.C. Obtainable from P. S. King and Staples, Ltd., 14, Great Smith Street S.W.1. 1*s.* 6*d.*

Special Articles

CROYDON OBSTETRIC SERVICE
RESULTS IN 18,600 BOOKED DELIVERIES

RUFUS C. THOMAS
F.R.C.S.E., M.R.C.O.G.
ASSISTANT MEDICAL OFFICER OF HEALTH FOR OBSTETRICS AND OBSTETRIC CONSULTANT, COUNTY BOROUGH OF CROYDON

THE Royal College of Obstetricians and Gynæcologists has recently published its *Report on a National Maternity Service*. In the section dealing with maternal mortality the report makes the following statement: "The integration of institutional, domiciliary, antenatal and consultant services has had a notable effect on the maternal mortality of those boroughs that have planned on those lines (e.g., Croydon, Luton . . .)."

During the past eight years the scope of the Croydon Obstetric Service has become progressively wider, the integration of its institutional, domiciliary, antenatal, and consultant services has had sufficient time to become consolidated, and the number of booked deliveries has reached a figure large enough to justify conclusions on the results. The aim of the obstetric scheme of the county borough has been described by Dr. O. M. Holden, M.O.H., in his clinical report for 1938 as "the ideal of complete antenatal, natal, and postnatal supervision under the same specialist obstetrician." The service became completely comprehensive in 1937. In July, 1937, following the Midwives Act, 1936, a domiciliary midwifery scheme was started, its clinical work being integrated with that of the service as a whole; in November, 1937, the work of St Mary's Maternity Hospital also came completely under the clinical control of the borough obstetrician. The figures which follow comprise the booked deliveries after the 28th week of Mayday Hospital maternity department and the domiciliary midwifery service during the period July 1, 1937, to June 30, 1945, and of St Mary's Maternity Hospital from Nov. 1, 1937, to June 30, 1945.

From 1937 onwards, the scope of the service has steadily grown until it now deals with about three-quarters of the total births in Croydon. The figures for 1943 show that of a total of 3785 live- and still-births allocated to the borough, 2876 were dealt with by the service. In addition, about 200 patients were referred by nursing-homes and independent midwives for antenatal supervision or specialist opinion, and about 50 cases were seen by the obstetrician in consultation with their own doctors. These numbers do not include abortions and ectopic gestations, of which about 200 are dealt with yearly, chiefly as emergencies. It may be said that 85% of the expectant mothers of Croydon in 1943 came, at one time or another, under the clinical influence of the service. The work of the service must, therefore, have a considerable bearing on the maternal mortality, stillbirth, and neonatal death-rates of the borough as a whole. The obstetric services provided by the county borough have been described by Dr. Holden in his 1938 report, and by Thomas (1940). The table shows the numerical details of 18,632 booked patients delivered after the 28th week during the period under review.

Year	Mayday Hosp.	St. Mary's Hosp.	Domiciliary	Total
1937	475	89	180	744
1938	825	490	886	2204
1939	815	451	994	2260
1940	786	489	935	2210
1941	616	579	730	1925
1942	960	561	1153	2674
1943	1097	611	1072	2780
1944	1033	541	991	2565
1945	496	292	485	1273
	7103	4103	7426	18,632

Among these 18,632 mothers, there were 190 sets of twins. The total number of infants delivered was therefore 18,822. The incidence of twin pregnancy is almost exactly 1%. There were no triplets.

MATERNAL DEATHS

Among the mothers, 14 died after delivery. In addition, 3 mothers died undelivered. The 17 deaths gives an overall uncorrected maternal mortality of 0·9 per thousand total births. The causes of these deaths are briefly given below:

DEATHS AFTER DELIVERY IN HOSPITAL (12)

1. Acute yellow atrophy. Forceps delivery. Macerated hydrocephalic fœtus.
2. Cæsarean section. Pulmonary embolism on 11th day.
3. Postrheumatic mitral stenosis. Collapse after cæsarean section.
4. Myocardial degeneration and obesity. Died under anæsthetic during forceps delivery.
5. Myocardial degeneration and obesity. Sudden death after spontaneous delivery.
6. Severe antenatal varicosities. Forceps delivery. Thrombosis of internal saphenous vein. Pulmonary embolism on 14th day.
7. Trial labour. Cæsarean section. Peritonitis.
8. Cæsarean section. Pulmonary embolism.
9. Myocardial degeneration and obesity. Cæsarean section for maternal and fœtal distress. Progressive cardiac failure.
10. Trial labour. Cæsarean section. Abdominal sepsis.
11. Obesity, endocarditis, coronary atheroma, calculous cholecystitis. Forceps delivery for maternal distress. Postpartum hæmorrhage. Manual removal of placenta and blood-transfusion.
12. Acute lobar pneumonia and empyema. Died on 6th day of illness, just after delivery of premature infant (4¾ lb., spontaneous).

DEATHS UNDELIVERED IN HOSPITAL (3)

13. Eclamptic fits during first stage of labour. Died during second convulsion. Autopsy showed spontaneous rupture of uterus.
14. Concealed and revealed accidental hæmorrhage. Couvelaire uterus. Died 3 hours after admission, in spite of blood-transfusions.
15. Congenital heart disease, mitral and tricuspid stenosis, sudden collapse at 30th week. Autopsy showed cor bovinum.

DEATHS AFTER DELIVERY AT HOME (2)

16. Twin pregnancy. First baby born spontaneously. Prolapse of second cord. Forceps delivery of second child. Retained placenta, postpartum hæmorrhage. Died before blood-transfusion could be given.
17. Spontaneous delivery. Pelvic thrombosis. Pulmonary embolism. Small piece of placental tissue found in utero at autopsy.

Maternal deaths are classified by the Registrar-General under two headings: (*a*) directly due to pregnancy; (*b*) not directly due to, but associated with, pregnancy. Of the 17 deaths, 10 were unquestionably directly due to pregnancy (nos. 1, 2, 6, 7, 8, 10, 13, 14, 16, and 17). This gives a maternal mortality directly due to pregnancy of 0·53 per thousand total births. Of the remaining 7 women, it is noteworthy that 6 were the subjects of cardiac disease. Three were cases of obesity with myocardial degeneration (nos. 4, 5, and 9). A fourth had combined endocardial and myocardial disease and advanced coronary atheroma, with obesity and calculous cholecystitis. The other two were the subjects of valvular disease, one acquired (no. 3), the other congenital (no. 15). Lastly, the patient who died from a pneumococcal pulmonary infection came into labour on the last day of the illness. Labour was premature and easy, and did not have any influence on the ultimate issue. The maternal mortality from causes associated with, but not directly due to, pregnancy is 0·37 per thousand total births.

STILLBIRTHS AND INFANT DEATHS

Out of 18,822 infants delivered, 416 were stillborn. The stillbirth-rate is therefore 22·1 per thousand total births.

In computing the neonatal deaths, it must be explained that, as a rule, women booked for home delivery who come into labour very prematurely—i.e., earlier than the 37th week—are admitted to hospital for delivery, and that infants born at home whose condition at or after birth is not good are also admitted to hospital with their mothers. Deaths among these babies are included in the hospital figures. The number of infants who died in hospital during the first 21 days (including those admitted after domiciliary delivery) was 228. In addition, 33 infants died at home while the midwives were in attendance—i.e., during the 14 days of the puerperium. The

total number of infant deaths according to the above standard, therefore, was 261 out of 18,406 live births. The neonatal mortality is 15·2 per thousand live births.

COMPARATIVE STATISTICS

It will be of interest to compare the maternal mortality, and stillbirth and infant death-rates, for the complete years 1938–43 inclusive, of England and Wales and the county borough of Croydon as a whole, with the results in the booked cases of the Croydon Obstetric Service. The figures for maternal mortality for England and Wales, and for the county borough of Croydon, are taken from the returns of the Registrar-General. Those for the stillbirths and neonatal deaths for England and Wales were published by Stocks (1944), and for the county borough of Croydon from the Registrar-General's returns, and the annual reports of the M.O.H. for Croydon.

Year	MATERNAL MORTALITY			STILLBIRTHS			NEONATAL DEATHS		
	England and Wales	Croydon C.B.	Croydon Obst. Serv.	England and Wales	Croydon C.B.	Croydon Obst. Serv.	England and Wales	Croydon C.B.	Croydon Obst. Serv.
1938	2·97	0·87	0·4	38·3	28·0	22·2	27·2	17·0	12·0
1939	2·93	1·16	0·4	37·8	31·0	28·3	27·0	23·0	14·8
1940	2·16	0·99	0·45	36·1	28·0	20·9	27·8	19·0	9·1
1941	2·23	3·24	2·1	34·4	25·0	21·3	27·5	18·0	11·5
1942	2·01	3·35	1·47	33·0	30·0	23·6	26·1	22·0	15·1
1943	2·29	0·53	0·7	30·2	29·0	23·4	24·5	22·0	15·7
Aver.	2·43	1·69	0·92	34·9	28·5	23·3	26·6	20·0	13·03

In comparing the neonatal mortalities it must be remembered that the figures for England and Wales and for the county borough of Croydon are calculated for deaths in the first month of life, whereas the figures for the Obstetric Service are for the first three weeks. A study of the vital statistics tables relating to neonatal mortality within the first month of life for the county borough of Croydon, for the years being compared, shows that of these deaths, 92% occurred within the first three weeks. The basis for comparison is therefore fairly close.

ABNORMAL CASES

Breech presentation.—There were 476 breech deliveries, an incidence of 1 in 39, or 2·5%. There was no maternal mortality.

Forceps delivery.—The number of infants delivered by forceps was 850, an incidence of 1 in 23, or 4·3%. Three mothers died, 2 after delivery in hospital, and 1 after delivery at home.

Cæsarean section was performed on 301 patients, an incidence of 1 in 61, or 1·6%. The lower segment section was the operation of choice, being carried out on 243 occasions. Six mothers were lost, a maternal case-mortality of 1·96%.

Placenta prævia.—There were 118 cases. Of these, 22 in which the placenta was central and 12 in which it was marginal were treated by cæsarean section. The remainder were treated by artificial rupture of the membranes, with the application of vulsellum forceps to the fœtal scalp when required to control bleeding. There was no maternal mortality.

Abruptio placentæ.—There were 81 cases. The general treatment consisted of sedatives, treatment of shock and blood-loss by blood-transfusions, followed by artificial rupture of the membranes where necessary. One patient died undelivered, a maternal case-mortality of 1·2%.

Toxæmia.—Included under this heading are all patients admitted with albuminuria and/or hypertension. The numbers therefore include all cases of pre-eclamptic toxæmia, eclampsia, essential hypertension, and acute pyelitis of pregnancy. The total number admitted was 1427, there being 152 cases of acute pyelitis. Ten patients developed eclampsia. One patient died undelivered (no. 13 in the list of deaths).

The low incidence of eclampsia is noteworthy, and is partly accounted for by our practice of inducing labour at the optimum moment, when further treatment is thought to be unwise from the mother's point of view in regard to her future health, or where eclampsia is thought probable if the pregnancy was allowed to proceed further. Most of the fits which did occur were of the postpartum variety.

Spontaneous rupture of uterus.—There were 2 instances, one of which has been described in the notes of maternal deaths.

The other was a patient who had had a classical cæsarean section performed 8 years previously, and had attended our clinic from the 12th week of the present pregnancy. She had been well until the 32nd week, at which time she was admitted to Mayday Hospital four hours after having collapsed at home. At laparotomy, a fœtus of 4 pounds, with the placenta, surrounded with blood-clot, was found in the abdominal cavity, and about 2 pints of free blood. The uterus was split from top to bottom, and turned completely inside out. A rapid hysterectomy was performed, and 2 pints of saline poured into the abdominal cavity before closure. She improved rapidly after blood-transfusion, and made an uninterrupted recovery.

Ruptured rectus abdominis muscle.—A case of this interesting complication was treated in 1945, and will be reported shortly. The patient recovered after evacuation of about 1½ pints of clot and ligature of branches of the deep epigastric artery.

DISCUSSION

The Obstetric Service is fully comprehensive in its scope, providing an inpatient and domiciliary midwifery service, the whole of which is completely integrated, and under the direct clinical control of a whole-time specialist obstetrician. The services of the obstetrician are available to the practitioners in the borough, and antenatal supervision of the cases of independent midwives and nursing-homes is also undertaken, several hundred expectant mothers in this class being dealt with each year. The aim of the service has been to encourage the closest coöperation with all engaged in the practice of obstetrics in the borough.

A service modelled on similar lines would be suitable to the needs of any county borough or borough of population up to 250,000. For smaller boroughs, it is only necessary to adjust the number of personnel to suit the smaller needs. That such a service should be under the clinical control of a single specialist has great advantages. As the antenatal supervision of both inpatients and outpatients is under his direct control, all abnormalities from both sides can be brought to his notice with the minimum of delay. Cases originally booked for domiciliary delivery who may be found later in pregnancy to be more suitably delivered in hospital can have the necessary accommodation provided immediately, their further supervision being undertaken on the inpatient side of the clinic. If during the course of a domiciliary delivery unexpected complications arise, the case can be admitted to hospital without delay. This is particularly important in cases of antepartum or postpartum hæmorrhage, for whom accommodation is always available at a moment's notice. If resuscitative measures are needed, the emergency flying squad, with all the apparatus for blood-transfusion and other treatment, goes out, and, after the patient's condition has been sufficiently restored, brings her into hospital. A further point about the supervision of the domiciliary cases is that the midwives attend and take part in the work when their own patients are being examined, and hear the results of each examination, together with any instructions which may be found necessary. In such ways an endeavour is made to provide for all eventualities.

SUMMARY

The results of 18,632 booked deliveries after the 28th week dealt with in the eight years to June 30, 1945, by the Croydon Obstetric Service are recorded.

The number of infants delivered, including 190 sets of twins, was 18,822.

Of the mothers, 14 died after delivery, and 3 died undelivered. A short history of each fatal case is given.

The maternal mortality according to the classification of the Registrar-General is: directly due to pregnancy, 0·53; associated with pregnancy, 0·37; total (all causes) 0·9 per 1000 total births. The stillbirth-rate was 22·1 per 1000 total births, and the infant death-rate 15·2 per 1000 live births.

Acknowledgements are due to Dr. Oscar M. Holden, M.O.H. for Croydon, for permission to publish these results, and for access to and permission to quote from his official reports regarding neonatal mortality-rates.

References.—Stocks, P. (1944) *Lancet*, ii, 65.
Thomas, R. C. (1940) *Brit. med. J.* i, 562.

NEW YEAR HONOURS

PUBLICATION of the New Year honours was completed on Jan. 9. The names of the following medical men and women should be added to the list which appeared in our issue of Jan. 5.

Knight Bachelor

HAN HOE LIM, C.B.E., M.B. Edin.
For public services in the Straits Settlements.

C.B.E. (Military)

Air Vice-Marshal KENNETH BIGGS, M.C., M.R.C.S.
Air Vice-Marshal DUNCAN MCLAREN, M.B. Glasg.
Air-Commodore F. J. MURPHY, M.B. Dubl.
Group-Captain V. R. SMITH, M.R.C.S.
Air-Commodore W. J. G. WALKER, M.R.C.S.

O.B.E. (Military)

Group-Captain J. F. BROMLEY, M.B. Manc., M.R.C.P.
Group-Captain A. F. COOK, L.R.C.P.I.
Squadron-Leader W. L. JAMES, M.R.C.S.
Colonel H. A. MOFFATT, D.S.O., F.R.C.S., S.A.M.C.

O.B.E. (Civil)

Prof. SAUL ADLER, M.B. Leeds, M.R.C.P.
Head of the department of parasitology, Hadassah University; for services to the Forces.
PERCY REGINALD BOLUS, M.B. Lond.
Director of medical services, Ministry of Pensions.
JOHN LAIRD MCKENZIE BROWN, M.R.C.S.
Medical officer for civilian defence, Metropolitan Essex.
WILFRED SAMUEL HAMILTON CAMPBELL, M.B. Edin.
County medical officer, Lincolnshire (Lindsey) county council; for services to civil defence.
DOUGLAS HENRY COLLINS, M.D. Lpool.
Medical superintendent, Wharncliffe Emergency Hospital.
Mrs. MARY AYLWIN COTTON, M.B. Lond.
Principal, Foreign Office; recently employed in the Ministry of Economic Warfare.
ALEXANDER MILLAR MEEK GRIERSON, M.D. Edin.
Senior assistant medical officer, Manchester; for services to civil defence.
LESLIE GEORGE HOUSDEN, M.D. Lond.
Chairman of the mothercraft training subcommittee, National Association of Maternity and Child Welfare Centres.
JOHN JEFFREY, M.D. Edin., F.R.C.S.E.
Hospital officer, Aberdeen, Department of Health for Scotland.
JAMES JOHNSTONE, M.B. Glasg.
Medical superintendent, Hairmyres Hospital, Lanarkshire; for services to civil defence.
Major A. C. W. KNOX, M.C., M.B. Aberd.
Assistant commissioner, No. 1 district, St. John Ambulance Brigade.
IAN HYSLOP MCCLURE, M.B. Edin., F.R.C.S.E.
Consultant surgeon, county of Orkney; for services to civil defence.
WYLIE MCKISSOCK, M.S. Lond., F.R.C.S.
Surgeon-in-charge, neurosurgical centre, Atkinson Morley Emergency Hospital, Wimbledon.
HENRY JOHN NIGHTINGALE, M.S. Lond., F.R.C.S., J.P.
Senior surgeon, Royal South Hants and Southampton Hospital, Emergency Medical Service.
WILLIAM POWELL PHILLIPS, M.R.C.S.
Deputy medical officer of health, Cardiff; for services to civil defence.
THOMAS POOLE, L.R.C.P.E.
Lately medical officer in charge, military prison and detention barracks, Riddrie, Glasgow.
SYDNEY CLIFFORD PRITCHARD, M.D. Edin.
Medical officer in charge, Hornsey Central Hospital, Emergency Medical Service.
STEPHEN JOHN SCURLOCK, M.C., M.D., M.S. Lond.
Medical superintendent, Ministry of Pensions.
IAN SCOTT SMILLIE, M.B. Edin., F.R.C.S.E.
Orthopædic surgeon, Scottish Emergency Medical Service.
BRYCE MCCALL SMITH, M.B. Edin.
Medical superintendent, Victoria Infirmary, Glasgow; for services to civil defence.
THOMAS EDWIN PRYCE-TANNATT, M.B. Lond.
Inspector of Salmon and Fresh Water Fisheries, Ministry of Agriculture and Fisheries.
GEOFFREY SYDNEY TODD, M.B. Sydney, F.R.C.P.
Medical superintendent, King Edward VII Sanatorium, Midhurst; for services to civil defence.
Miss BEATRICE ETHEL TURNER, M.B. Lond., F.R.C.S.E., F.R.C.O.G.
Consultant obstetrician, Shardeloes Emergency Maternity Hospital, Bucks.
JOHN THEODORE WHITLEY, M.B. Manc.
Assistant commissioner, Essex, St. John Ambulance Brigade.

M.B.E. (Military)

Squadron-Leader W. O. BAIRD, M.R.C.S.
Squadron-Leader F. J. HALLINAN, M.B. N.U.I.
Flight-Lieutenant K. M. HAY, M.B. Camb.
Flight-Lieutenant A. F. LANG, M.B. Edin.
Squadron-Leader K. A. W. LAW, M.B. Durh.
Wing-Commander DAVID STEVENSON, M.D. Edin.

M.B.E. (Civil)

Captain C. A. BATHFIELD, G.M., M.R.C.S.
Station medical officer, Air Transport Auxiliary.
WILLIAM FUNSTON BRYSON, M.B. Belf., D.L.
Secretary, Enniskillen hospitality committee.
Mrs. GLADYS ANYAN DANBY, L.M.S.S.A.
County superintendent, Somerset, St. John Ambulance Brigade.
Miss MARGARET HOLLIDAY, F.R.C.S.I.
Resident medical officer, Maternity Hospital for the Wives of Officers, Fulmer Chase, Bucks.
JOHN INGRAM, M.B. Aberd., J.P.
Medical practitioner, camp reception station, St. Agnes.
PHILIP INWALD, M.B. Lond.
Medical officer in charge, civil defence mobile first-aid unit, Islington.
Miss EMMA MARY JOHNSTONE, L.R.C.P.E.
Lately medical officer in charge of mobile civil defence and post, Westminster.
Mrs. ETHEL WINIFRED LEE, M.B. Glasg.
County borough organiser, Hastings, Women's Voluntary Services.
JOHN WILLIAM PARKS, M.D. Camb.
Assistant medical officer, General Post Office.
Rai Bahadur RAM SWARUP SRIVASTAVA
Civil surgeon retd, Dehra Dun, United Provinces.

A.F.C.

Wing-Commander J. R. CELLARS, M.B. St. And.

Kaisar-i-Hind Medal

JAMES WILLIAM BOTTOMS, M.B. Lond.
Medical missionary, Baptist Mission Hospital, Chandraghona, Chittagong Hill Tracts, Bengal.
Miss MADELINE SHEARBURN, M.B.E., M.B. Durh.
Doctor-in-charge, Mission Hospital, Tank, North-West Frontier Province.

THE MALE NURSE

THE Minister of Health has decided that we should be making more use of male nurses in our hospitals, not merely to ease the present difficulties, but as a permanent policy. This is a principle which has long been supported in our columns: male nurses have been noted for much good work in mental hospitals, and there is every reason why they should be employed freely in the male wards of other types of hospital. Moreover, the grade of assistant nurse should offer opportunities to men who have trained as nursing orderlies in the Forces, and who, while wishing to go on with nursing as an occupation, do not feel able or willing to qualify for the State register.

The Minister has this idea in mind and suggests (circular 2/46) that some of those now leaving the Forces might be enrolled as assistant nurses forthwith, if their experience is suitable. Others may be eligible to take the State examinations without further training, and others may be willing to work for State registration. He wishes that all general hospitals with training facilities should consider whether they can establish complete training schools for male nurses. If this is not possible they might become affiliated schools, or training schools for male assistant nurses.

All local authorities willing to employ male nurses are asked to let the appointments office of the Ministry of Labour know the additional numbers of male nurses in the different grades whom they could accept. Since male nurses are usually non-resident it will not be necessary as a rule to provide additional quarters for them beyond cloakrooms and a common-room; but the Minister of Health will consider minor schemes of alteration to provide such necessary accommodation.

A BILL for the establishment of a tuberculosis authority has been presented to the parliament of Northern Ireland. The authority, which is to consist of 13 representatives of county and county-borough councils and 4 nominees appointed by the ministry of health, is to take over the present functions of councils in relation to tuberculosis. Maintenance costs are to be shared by the government and local authorities, and the cost of capital expenditure is to be borne by the government.

In England Now

A Running Commentary by Peripatetic Correspondents

"The vile prison of afflicted breath."
SHAKSPEARE, *King John*, Act III, Sc. IV, 19.

A HUNDRED years ago a contributor to the *Quarterly*, inveighing against the vitiated atmosphere of London drawing-rooms, concluded his observations with the following passage:

"Everybody present knows that outside the plate-glass windows of the rooms in which we are suffering there is at this moment in waiting, not two inches from us, an overwhelming supply (which might be warmed) of pure air, just as desirous to rush in as the foul air we have been breathing and rebreathing is eager to rush out."

How far have we advanced since then in the application of scientific knowledge to ventilation? Every morning and every evening I have to spend an hour or so in a little box provided by a railway company, shut up with nine, or even a dozen, other people. Let us be fair and take the lower figure as representing the normal seating capacity. This wooden box measures 7 feet 10 inches in one direction and 5 feet 3 inches in the other; and its average height is about 7 feet. Let us say in our generosity that the space would contain 300 cubic feet, if the box were empty. But the box isn't empty. There is a thick cushioned squab on each side, leaving a gap of only 12 inches for the insertion of the passengers' legs, and a primitive heating coil under the seat. We have also to calculate the displacement of ten adults with their cases and parcels. The noses of those who sit opposite each other are less than 4 feet apart.

The box is usually sealed, and in this condition has an average temperature up to 90° F. and a relative humidity of 100 per cent. There are, however, six windows (each measuring approximately 2 ft. 6 in. × 1 ft. 11 in.) which create a localised icy downdraught, while the heater (12 in. behind my heels) provides ideal conditions for the eruption of chilblains. When the door (6 ft. 6 in. × 1 ft. 11 in.) is opened, our first sensation is one of relief; but the temperature falls rapidly to 32° F. And when Mrs. Jewkes leans out of the window talking to her friend—"Well, goodbye, dear; I'll see you at Oxford Circus at 11 o'clock tomorrow. Isn't it perishingly cold?"—I have on occasion recorded 7 degrees of frost.

Even this is not the whole story. Of the ten bodies above mentioned six are uttering products of imperfect combustion in clouds, containing (I am told) masses of tarry carbon particles, 6–8% of CO, and quantities of NH_3, pyridine, and other noxious matter of organic origin. These give rise to headache, tremors, palpitations, upset of bowel rhythm, amblyopia, and extrasystoles. Three other passengers are sneezing at short intervals, one of them straight into my face; and several of the smokers cough as a normal routine, whether they have colds or not. The compartment has vestigial traces of ventilators, but they never were any good, and they have not been in working order for years.

Now it is incontrovertible that disease-producing bacteria are emitted from the respiratory tracts of the occupants. It has been calculated that during a single sneeze something like 20,000 droplets are expelled with a muzzle velocity of 150 feet per second. Their diameter varies from 10μ to over 1 mm. Even the larger droplets, bearing an incredible number of germs, fall in a curved trajectory and do not reach the ground within 15 feet. (Let me remind you that the noses at risk are less than 4 feet apart.) The smaller droplets become converted into nuclei which behave much like particles of smoke and penetrate into every nook and cranny of our being.

It follows that the air of this foul cell is choked with lively and eager bacteria, many of them derived from persons who are manifestly in an infectious condition. It is small wonder that we go on picking up colds and other infections in trains and taking them home to our wives and families. If a person coughs into my face at short range, I am more likely to become infected by him than if I were breathing the more widely dispersed bacteria-laden atmosphere of a larger space. In addition, localised chilling of the skin caused by draughts is known to precipitate an attack of coryza, cystitis, or other local inflammatory reaction.

There are hazards associated with the isolated compartment, not scheduled in any sickness code, but a menace to society all the same. Rude and violent men have been known to interfere with lone passengers, and the communication cord is seldom within reach of a damsel in distress. Again, the railway companies themselves have recently been bewailing the wanton destruction of seat cushions, window straps, and so on. The remedy is in their own hands—to provide open coaches which can be properly supervised. The coaches of the American type offer comfortable, high-backed, adjustable seats which encourage passengers to avoid breathing into each others' faces, because they all face in the same direction. Although these coaches are usually kept too hot for my comfort, they are never foul; and the fault of overheating lies with American custom and not with the air-conditioning system. Each coach has a vestibule with double doors, so that the intruder does not carry with him a blast of cold air.

Admittedly there are some objections to the open coach—for example, that infant cries and other untoward noises may upset a whole carriage instead of ten victims in an isolated compartment. But this objection has to be balanced against a much greater freedom of movement. In any case there is little substance in the plea: I have travelled many hundreds of miles in such coaches and hardly remember a single instance in which there was any offence to eyes or ears. One might imagine dilatory arguments being put forward by the technical folk, to show that it would be difficult to introduce to the suburban lines rolling stock that was not readily interchangeable with the standard type, and that this would cause confusion during holiday rushes. But the public health is too important to be put off by technical issues.

Some of the railway companies in this country have been good enough to issue questionnaires to passengers, inquiring inter alia whether they preferred saloon carriages to separate compartments. I am credibly informed that some 60% were in favour of separate compartments, and it is possible that the companies may be making their plans in accordance with such estimates of public opinion. I hope they will first take note of the fallacies inherent in this method of discovery. It should be remembered that the vast majority of those questioned have no background of experience. They do not know what a well-designed coach is like, and they are therefore incapable of expressing a just opinion. Quite apart from this, however, it is surely reasonable that the railway authorities should attach a high value to the question of health and not allow themselves to be unduly influenced by a compound of whim and inertia.

Now that so many of us travel by train the matter is of great importance. It is all very well to post notices telling us that coughs and sneezes spread diseases, but we must face the practical issues involved. It is relatively easy, by such means as air-conditioning, assisted perhaps by aerosols or other anti-bacterial agents, to make a long carriage epidemiologically pretty safe, and certainly fresh and wholesome to the nostril; whereas nothing on earth is going to protect us from a man with a really bad cold, sitting with his nose four feet in front of us in a small compartment. Rail transport is a public service, and the true interests of the public ought to prevail.

* * *

It is not surprising that disappointed appellants for war disability pensions are dissatisfied and disgruntled: was there ever an unsuccessful litigant who agreed that he had received justice? No man is a competent advocate of his own cause. Wishful thinking inspires a perverted presentation of the facts; and what was originally a prejudiced impression develops with time into an established and honest belief.

Moreover, a layman is not in a position to see the technical details in their proper perspective. He is inclined to argue that any physical deterioration—let alone an unmistakable morbid condition—that has developed during his service is a direct consequence of military conditions which must therefore be regarded as directly responsible. When his claim to a pension or compensation is rejected, he is led to the resentful conclusion that the doctors, lawyers, and Government

officials concerned in the matter of pensions are united in a conspiracy to deny him a square deal, to ignore his claims for consideration, and deprive him of his legitimate award. If we may believe the correspondence in the lay press, our profession is by no means unanimous on the criteria by which our opinions should be regulated, opinions which in most cases will influence the authorities who will make the ultimate decision.

In wounded men the position is plain. Compensation is unquestioned and can even be mathematically regulated according to the nature and extent of the disability. Likewise we need not hesitate to accept the responsibility of tropical service, the effects of diseases which would, of course, never have been encountered had the man remained at home. The hardships of captivity and of shipwreck, though not so accurately assessed, are justly comprehended within the same category. The trouble arises over the conditions which have a dubious relation to the circumstances of a military life, whether in the field or on home service. Time does not stand still because one is in khaki, Navy-blue, or Air Force blue. Uniform does not suspend or retard the processes of Nature; does it accelerate them? Speaking generally, is Service life more or less healthy than civilian life? It is all very well to talk about strain and worry as if these were encountered exclusively in the Services. To the majority the benefits are surely unexceptionable. On average the soldier's food is far superior to that of the civilian in war-time and indeed in peace. His hygiene is immeasurably better, his welfare is a source of perpetual solicitude, and his access to treatment unlimited. Only to the older men of fixed habits, who react badly to disciplinary restrictions, do regularity, open air, and exercise make no appeal, and they are prepared to blame what they dislike for any apparent ill-consequences.

Then there is the layman's attitude towards such conditions as leukæmia, cerebral tumour, malignant disease of the lung, Addison's disease, rupture of a congenital aneurysm—examples which have occurred in my own experience. We may say that such diseases are encountered in civil life and cannot be fastened on military service, but since we do not know their cause we are challenged to prove that a military life may not be responsible. Well, we can only answer that there is no scrap of evidence to point to a greater incidence of the particular disease in the Services. The lawyer likes, expects, or at least demands an unqualified answer to a categorical question. Would this disease have developed, or have progressed less rapidly, if the man had remained in civil life? Of course we can't give him the monosyllabic reply he wants, and instead attempt an explanation which though honest is often uncertain and generally unconvincing.

What do they say about V.D.? This is outside my beat, but though I am pretty sure of the judgment, I am prepared to accept a brief on behalf of a claim for compensation. Temptations resulting from the charm of uniform; periods of inactivity and boredom; lack of distractions and amusements; separation with deprivation of domestic amenities and their controlling influence—these are all direct consequences of military service. So why not a pension?

* * *

Your critic who reviewed the film *Conquest of a Germ* with such approval will like the new Noel Coward film *Brief Encounter*. This record of the furtive railway-station romance of a married doctor and a married woman is a noble story, sordid though it sounds in such bare outline. The doctor portrayed is an understanding and gentle lover who in one brief snatch over a cup of refreshment-room tea reveals his passionate interest in his work—preventive medicine, with special reference to the pneumoconioses. Yes, here is another film being shown to the general public which presents a doctor as a real man with human interests and passions, a moving tale told with great sympathy and care.

Another film, of quite a different kind, which should be seen when it comes round is *Painted Boats*, a dramatised presentation of the canals and the life of those who live on them. It breathes the love of Britain in a genuine and therefore attractive way; it would be nice to say that it was made by the British Council, but it wasn't.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M.P.

WITH Parliament in recess and the floor of the House innocent of legislation, changes are being prepared with even greater activity than before the adjournment. Progress is being made with the vast problems of the coal industry, with the setting up of working parties for export industries, with the establishment of new factories in the "development" (once the "depressed") areas, and with consultations on the National Health Service.

Soon after Parliament reassembles we shall know what the proposals of the Minister of Health are. It is to be hoped that at the same time as, or perhaps before, the actual tabling of the proposals on the order paper of the House of Commons, an announcement will be made on the conditions under which medical work has to be carried out during the preparatory period. If a date in 1948 is fixed as the time when the new service is to begin, then we shall have a period of about two years of carry-over during which medical work must go on.

What are to be the conditions in this medical interregnum? At present uncertainty is holding back a number of recently demobilised men and women who do not know where they stand. The Minister's announcement that there will be an end to the sale and purchase of panel and other public practices needs amplification by a statement of the methods by which this will be done. That there will be a planned scheme of compensation, including compensation for private as well as public practice, is known. That the compensation will be satisfactory to those concerned must be assured; but if the Government's general plans of compensation in other cases are taken as an example, there is no need to fear anything else. There will be different schemes for the man wishing to retire from practice and for the man intending to switch over from his present practice to the National Health Service. But in all cases a practitioner's capital investment and the value of his practice as it would be assessed by one of the two chief agencies will be the factors determining the amount of compensation to be paid. The younger man who left behind him a practice with a debt on it still unpaid when he entered the Armed Forces will receive compensation equally with the older man who stayed behind. Even if the practice of the younger man has faded away.

During the interregnum it may be that succession to a practice may be offered to a man or woman coming out of the Forces on the normal terms of purchase which have hitherto been the means of transfer of practices. In such a case it is to be presumed that the purchaser will carry over the right to compensation held by the present incumbent. But this is a matter on which a statement should be made; for until it is made there may be difficulty of transfer of practices—even in urgent cases due to illness or death.

We have been fortunate enough to escape major epidemics up to the present, but many older practitioners have had too strenuous a time during the war and it is essential that many more of the younger returning doctors should take on the harness and be ready to take over when the National Health Service begins. The building of health centres—both the physical erection of the necessary premises and the building of the teams which will do the work—is a task demanding careful preparation. This interregnum in which we are living provides time for it.

On the hospital side the situation can be seen more clearly, although present arrangements are very mixed. Evidently there is to be in the future one great integrated national hospital service which will be the spinal column of the National Health Service. The medical schools, the teaching hospitals, are to have that freedom which

the proper discharge of the functions of a university demands.

The more the plans of the National Health Service emerge from the realm of generalities into the hard light of realisable, and realised, projects, the more impressive do they become. Our country has vast medical assets, in hospital buildings of all kinds, in hospital and general medical equipment, in university teaching hospitals. What can be done by the use of these assets when they are all coördinated has been shown by the E.M.S. in its very great work for the Services during the war. But that was only a beginning. A national hospital service as the backbone of the National Health Service will go far beyond what the E.M.S. did in time of war. For those returning doctors whose bias takes them towards hospital or institutional work, there need be no hesitation in deciding whether to enter now or stand back until the scheme is more fully defined.

Interesting queries are raised about matters which take us farther afield and outside the radius of the National Health Service as it will be presented to the House of Commons for legislative action. What is to be the relation between this service and that of the Armed Forces which, in fulfilment of our obligations to the United Nations, we and other countries will be obliged to maintain? Many members of Parliament hope that the medical services of Navy, Army, and Air Force may become part of the National Health Service. Another matter is that of our relations with the Colonies. It is highly unlikely that the National Health Service will include the Colonial Medical Service as part of itself. But it is most desirable that the closest contact should be maintained between the medical service of Great Britain and the Colonial Medical Service. When once the National Health Service is safely launched it is to be hoped that these two great services can be made one.

These wider questions are reviewed here because it is in this wider sphere that all social, political, and economic questions will more and more be considered in the future. The National Health Service and the Colonial Medical Service will be part of the great world International Health and Medical Organisation to which all countries of the world will contribute. And it is to that perspective of world medical and health organisation that the medical and health work in this country and in our Colonies must be related.

On Active Service

CASUALTY

KILLED

Captain BERNARD SIDMAN, M.B. Leeds, R.A.M.C.

AWARDS

MENTIONED IN DESPATCHES

R.N.V.R.

Surgeon Commander W. McO. MACGREGOR

Surgeon Lieutenants.—T. E. BAXWELL, A. F. ROSS

R.A.F.V.R.

Group Captains.—V. S. EWING, F. W. P. DIXON, M.B.E., H. C. S. PIMBLETT

Wing Commanders.—H. E. BELLRINGER, R. E. W. FISHER, H. F. HARVEY, L. P. MCCULLAGH, J. C. TAYLOR, K. G. BERGIN, T. A. W. EDWARDS, E. B. HARVEY, R. C. JACKSON, F. V. MACLAINE, J. B. METHVEN, A. MUIR, J. V. QUINN, H. P. R. SMITH, A.F.C., E. O. WALKER

Squadron Leaders.—B. A. J. ARTHURE, J.C.McC. BROWNE, F. R. BUCKLER, T. G. DAVIES, E. O. EVANS,

Squadron Leaders—continued

B. J. FRANKENBERG, M. O. J. GIBSON, M. MCLELLAN, R. MACPHERSON, C. W. R. RAYNE-DAVIS, E. P. S. SNELL, J. WATSON, P. A. CARRIE, W. P. GREENING, H. HALSON, A. HARGREAVES, G. C. HARTILL, G. O. HORNE, I. MACL. MACKAY, I. C. B. PEARCE, E. E. PHILLIPP, D.C. RUSSELL, J. H. SPENCE, T. F. STEWART

Flight Lieutenants.—N. N. BLAXLAND, E. S. BRAWN, H. D. FREETH, S. GRUBER, M. J. HOWLETT, G. E. MCFALL, R. M. S. MATTHEWS, C. E. NICHOLSON

Public Health

Middlesex Considers Tuberculosis

THE reputation of Middlesex for care of the tuberculous possibly stands higher than that of any other county; so the report of a committee appointed to review the Middlesex tuberculosis scheme has special value as a standard. If Middlesex recognises large gaps in its service other counties may reasonably be suspected of even larger ones.

CHEST CLINICS

The committee rightly holds that the success of any tuberculosis scheme turns on the efficiency of the chest clinics. As a long-term policy these should be sited within the curtilage of a general hospital. They should be comfortable and attractive, and developed to the highest possible degree, with appropriate equipment and staff; for sanatoriums can have little influence in reducing tuberculosis unless there are proper arrangements for early diagnosis, preventive work, and out-patient care.

Middlesex is divided into eight administrative areas each served by one clinic. Three of these are housed in old semi-detached buildings with no X-ray plants; only one is at a general hospital, and this is cramped for space; three others are equipped with X-ray plants and housed in separate buildings, two of which were originally built as clinics; the eighth, also equipped with X-rays, is in cramped quarters in the local county offices. In only one clinic, the committee says, was the accommodation really adequate. X-ray plants have been ordered for two of the clinics lacking them; and new premises, where it will be possible to install plant, have been found for the third. It is suggested that a ninth chest-clinic area might be established at Harrow, and might form part of Charing Cross Hospital if this is rebuilt at Northwick Park. A tenth clinic at Ashford County Hospital is contemplated.

Better accommodation for existing clinics is largely a matter of long-term policy; but staffing and equipment can be considered at once. The committee proposes that tuberculosis officers should be given salaries more in keeping with their consultant status, the new scale to begin at £1000 and rise by annual increments of £50 to £1250 yearly, with power of extension to £1500 for men of outstanding ability, and that each should ultimately work with an assistant tuberculosis officer. Each clinic should have a whole-time radiographer, a dark-room assistant, and a complete X-ray apparatus, and some might also have a screening set. Much of the work of the clinic is carried on by the nurses—three or more at each—who act as combined clinic sisters and home visitors. The clerical work is complex and growing, and could possibly be simplified by a better method of record-keeping. The committee also considers that an occupational therapist should be appointed to arrange occupational work among patients who must remain at home for long periods. Members of chest clinics and mass-radiography staff should have annual medical examinations, with radiography of the chest.

SANATORIA AND HOSPITALS

Middlesex maintains three institutions for pulmonary tuberculosis, and reserves wards for such cases in five county general hospitals, providing accommodation at the end of 1943 for 1294 cases; in addition, Grims Dyke, Harrow, takes 50 men patients for rehabilitation. The county council also maintains some 300–400 patients elsewhere. The report notes that, while the tuberculosis beds in Middlesex institutions have increased by nearly 500 in the last three years, those available in outside institutions have fallen by nearly 200.

The thoracic surgical unit, established during the war at Harefield Sanatorium, is to be kept there for the present, but in due course a special building may be put up for it; and other units of the same kind may be developed as they are needed. It is assumed that the 22 hutted wards built by the E.M.S. at Harefield will be taken over eventually by the county. Two wards will be kept for non-pulmonary cases, and the remainder will be used for early cases with good prospects of recovery, some being adapted for recreation, occupational therapy, and classrooms.

A unit of 50 beds will be allotted to each clinic area at the nearest county hospital. This unit will be used to assess difficult cases and to provide beds where those with advanced disease can be easily visited by relatives. "Bad chronic" cases will have beds in country houses. For "good chronics"—those who may be able to undertake a job, possibly their former work—an experimental hostel, it is suggested, might be set up where some 20 patients could live for a time, going out to work in the daytime and keeping touch with home and friends. They would thus be spared an abrupt return to ordinary life.

Research, the committee feels, must be encouraged, and members of the medical staff who wish to undertake original work should be supported. From time to time a research-worker with suitable qualifications might be engaged to study some special problem.

The committee agrees that certain of the council's tuberculosis officers should participate in the teaching of medical students.

Lower Mortality

The Registrar-General's return for the quarter ended Sept. 30, 1945, records a birth-rate of 15·6 per 1000 compared with 17·2 in the same period of 1944. In the previous five years the average rate for the September quarter was 15·1. Of the 167,962 children born, 86,713 were boys and 81,249 girls, a proportion of 1067 to 1000. The average for the ten preceding third quarters was 1058.

Infant mortality was 38 per 1000 related live births—the lowest recorded for any quarter, and 5 points below the average of the ten previous corresponding periods. In the four quarters immediately preceding, the rates were 40, 44, 59, and 41.

A general death-rate of 9·0 per 1000 compared favourably with 10·1 for the third quarter of 1944, and provided a new record. The average rate for the same period in the previous five years was 9·7. Births registered exceeded deaths by 70,863, the corresponding increases in the third quarters of 1942, 1943, and 1944 being 71,000, 70,832, and 76,340 respectively.

A total of 118,723 marriages was 36,421 higher than in the same period of 1944 and 5215 above the average for the same quarter in the previous five years.

Infectious Disease in England and Wales

WEEK ENDED JAN. 5

Notifications.—Infectious disease: smallpox, 0; scarlet fever, 1250; whooping-cough, 1048; diphtheria, 469; paratyphoid, 2; typhoid, 3; measles (excluding rubella), 771; pneumonia (primary or influenzal), 1165; cerebrospinal fever, 53; poliomyelitis, 13; polioencephalitis, 0; encephalitis lethargica, 1; dysentery, 285; ophthalmia neonatorum, 62. No case of cholera or typhus was notified during the week.

The number of service and civilian sick in the Infectious Hospitals of the London County Council on Jan. 2 was 1081. During the previous week the following cases were admitted: scarlet fever, 64; diphtheria, 43; measles, 11; whooping-cough, 23.

Deaths.—In 126 great towns there were no deaths from enteric fever, 6 (0) from measles, 1 (0) from scarlet fever, 14 (2) from whooping-cough, 12 (1) from diphtheria, 66 (7) from diarrhœa and enteritis under two years, and 123 (15) from influenza. Figures in parentheses are those for London.

Liverpool reported 12 deaths from diarrhœa and enteritis, and 8 deaths from influenza.

The number of stillbirths notified during the week was 217 (corresponding to a rate of 28 per thousand total births), including 20 in London.

THE U.S. Civilian Production Administration on Dec. 26 announced that in an effort to increase the production of penicillin it will give special priorities to producers and to builders of new penicillin plants. A statement from Washington says that most of the world-wide demand for penicillin at present centres on the 14 American plants, inasmuch as Canada, Australia, and the United Kingdom produce only about enough to supply themselves. Production in the U.S.A. has risen from approximately 400 million Oxford units in May, 1943, to an estimated 700,000 million units for 1945.

Letters to the Editor

INFECTION IN DAY NURSERIES

SIR,—The able paper by Dr. Allen-Williams in your issue of Dec. 22 will be welcomed as a serious scientific effort to obtain evidence on the much-discussed but little-investigated problem of the risk of infections in day nurseries. But those with practical experience of nursery work and administration will feel that certain points call for comment.

One of these is considered by Dr. Allen-Williams in her "discussion"—the potential inaccuracy in the ascertainment of the incidence of the various infections. Most medical officers of health will agree that she dismisses the matter too lightly. It may be taken as certain that even the mildest cases of all the infections mentioned will be discovered in those children who are in attendance at a nursery, and the nursery staff will tend to play for safety by treating minor skin conditions as "infections." On the other hand, it is doubtful if more than half the cases of measles occurring in children at home are actually notified and highly probable that some are forgotten and some completely missed. Of the other infections in the list, the mild cases of rubella, chickenpox, and impetigo will often be misdiagnosed by the mother as "food rash," "heat-spots," and "cold sores." The results would carry considerably more weight if the experiment were spread over a larger field in which the incidence of those infections whose ascertainment is more accurate was great enough to provide sufficiently large numbers for statistical validity.

A more important criticism, however, is that the investigation is too much of an academic exercise and has too little practical bearing on matters of present importance. At the moment there is a vigorous and acute controversy as to whether nurseries should or should not continue in their present form. What we need to know is not whether the risk of infection with one of a miscellaneous series of conditions ranging from the dangerous to the trivial is greater in the nursery than outside it but whether that risk constitutes a serious objection to the continuance of nurseries. From that point of view it is disappointing that a paper emanating from an institute of social medicine should deal with this subject in such an austerely scientific manner; it may be difficult to "balance the disadvantages attaching to a high infection-rate against certain recognised individual advantages to mother and child," but to attempt to do so would fall properly within the sphere of social medicine.

If we look at the subject from this angle, we can fairly say that at least four of the infections mentioned—rubella, chickenpox, impetigo, and mumps—are usually too trivial to be weighed in this balance. To these four we might possibly add uncomplicated measles and scabies as reasonable prices to pay for the excellent diet, the open-air life, and the social training which the good nursery gives and for the improvement in the family's economic circumstances which results from the mother's employment. It is further pertinent to mention that the very fact of nursery supervision is important in certain infections; in measles, for example, it ensures that prompt and proper attention is paid to the child's illness, whereas far too often the non-nursery child's measles is not taken seriously until complications make the parent realise that something serious is amiss.

If attendance at a day nursery increases the risk of infection, it is to be expected, as Dr. Allen-Williams finds, that infections will tend to occur at an earlier age. The significance of this finding is, however, obscured by the throwing together of all the infections listed and by the fact that all the children under the age of two are considered as a single group. For a child to contract measles or whooping-cough a couple of years earlier than might otherwise be the case can be a very serious matter, but a shift of the occurrence of impetigo or chickenpox from the fifth year to the third is usually of little moment. Again, if whooping-cough moves from the second age-group to the first, the effect will be more important if it is a move from the age of 3¼ to that of 1 year or under than if it is a move from 2¼ to 1¼.

None of the above criticisms should obscure the fact that this paper is of the utmost value in that it puts

forward a sound technique for the serious investigation of a problem in which we have tended to rely too much on general impressions often coloured by preconceived ideas. I believe that I speak for most of my colleagues in the public-health service when I say that we shall welcome opportunities to coöperate with Dr. Allen-Williams in that extension of her investigations which I have suggested. We know, however, from experience in other fields, that scientific data may easily be misused by the ignorant or the prejudiced for political or quasipolitical ends, and it would indeed be unfortunate if this preliminary study became the weapon of those who oppose the continuance or extension of nursery provision.

Accrington. JOHN D. KERSHAW, Medical Officer of Health.

PROSTATECTOMY

SIR,—The introduction of the new surgical technique can make no difference to the immediate results of prostatectomy. Hey stresses the value of asepsis. Every thoughtful surgeon will agree with him. Equally important is antisepsis. The use of electrolytic sodium hypochlorite, the sulpha drugs, and urea formic iodide has made prostatectomy as safe as any major operation can be.

I have thoroughly enjoyed reading your leading article of Dec. 1, but I cannot imagine any urologist of experience agreeing with your statement about the suprapubic operation as it is practised today. I have performed retropubic prostatectomy. Your optimism about it is dangerous.

Hampstead General and N.W. London Hospital, N.W.3. CLIFFORD MORSON.

SIR,—May I congratulate Mr. Millin on bringing retropubic prostatectomy to our notice. In my limited experience of the operation the points that have impressed me are the almost complete hæmostasis obtained and the shortened convalescence; but as a second-stage procedure the disadvantages of the retropubic operation seem to me to outweigh the advantages.

With regard to statistics there is a fallacy in Mr. Millin's letter in your issue of Jan. 5 which ought not to go unchallenged. It may well be that in a large series of men of 70 years one in every hundred can be expected to die each month. These deaths, however, will include instances of the manifold diseases to which the flesh is heir, and these cases will automatically be excluded from an average series of prostatics of 70, with the exception of unpredictable cardiovascular catastrophes. These would not number anything like one per hundred per month. Mr. Millin's inference, therefore, that during a period of seven weeks' convalescence 1·75% of a large series of prostatics would be expected to die regardless of operation or hospitalisation is clearly illogical.

St. James' Hospital (L.C.C.), London, S.W.12. HENRY K. VERNON.

"REASONABLE DOUBT"

SIR,—The ætiology of leukæmia is obscure. We know a few agents, such as benzol, which may produce it; but we are certainly not in a position to state what factors do not, and cannot, cause it.

I am impelled to emphasise these facts, because the popular press has recently stated that a pension has been refused to the widow of an Army officer who died of chronic lymphatic leukæmia. The Under-Secretary for War said that the claim had been rejected on the advice of an independent expert appointed by the Royal College of Physicians; but he did not explain to their lordships that no man can be an expert on the unknown.

In the absence of certain knowledge of the cause of leukæmia, one must surely concede that each case must be considered on its merits. Thus, one may have doubts about a relationship between trauma and the development of leukæmia; but he would be a bold man who denied the possibility.

I know nothing about the case to which the newspapers refer; but I am aware that the Royal Warrant lays down that, where a reasonable doubt exists, such doubt shall be resolved in favour of the applicant. And I am confirmed in my long-held opinion that an applicant for a pension or for compensation is more likely to get a run for his money if the arbiter be a judge than if he be an official or even an expert speaking ex cathedra.

London, W.1. A. PINEY.

HEPATITIS AFTER PENICILLIN INJECTIONS

SIR,—That the hepatitis reported by Howells and Kerr (*Lancet*, Jan. 12) was probably due to faulty technique of injections is suggested by the following evidence.

Early in 1945 it was noticed, in the medical wards of a British general hospital in Italy, that some patients with infective hepatitis, or at least with a condition clinically indistinguishable from this infection, gave a history of having been treated with penicillin for gonorrhœa a few months previously. Moreover we had the impression that these patients tended to have greater hepatic enlargement and were more seriously ill than the other cases of infective hepatitis which had not been so treated and were being admitted at the same time from the same area. Interest was also stimulated by the observation of an N.C.O. who said that of course he realised he would get jaundice after this new treatment for venereal disease. Further inquiry revealed that the patient next him in the queue for the three-hourly injections had remarked to him one day that he supposed he knew that he would probably be admitted for jaundice later on, because many men on this course developed it.

To avoid raising an unnecessary scare we decided that we would say nothing about this for a time but that three of us would make a point of asking every patient with jaundice whether he had had penicillin previously. Shortly after this one medical officer found that no less than 8 out of 9 men in his ward with infective hepatitis gave a history of a course of penicillin by injection within the past four months. Accordingly it was decided to warn all the medical officers. Unfortunately this period coincided with the normal decline in admissions for infective hepatitis during midsummer. However, during the next three months 16 out of 59 patients, admitted with an illness clinically indistinguishable from infective hepatitis, were found to have been treated with penicillin within the previous 2–4 months; 12 cases were collected during the period when suspicions were first aroused, which makes a total of 28 cases between January and June in the medical side of one hospital, and this at a time of year when the incidence of infective hepatitis was low. For the first three months of this period the inquiry was tentative; hence these figures are minimal, and the real incidence was in all probability higher.

At least 11 of the group had been treated for their venereal disease in the same clinic, most of them for gonorrhœa, but a few for syphilis. Inquiry at this clinic revealed that for the first three months of the year, owing to shortage of equipment, it had not been the practice to sterilise the syringe before each injection, though a fresh needle was used. Since then, however, with better supplies, a sterile syringe and a sterile needle were used each time. It might therefore be expected that the number of jaundice cases following the treatment would fall. Actually this has happened, but the statistics available are not such as to entitle one to say that this fall is definitely related to the change in technique.

Confirmation of these suspicions is suggested by information obtained from the orthopædic department of another hospital. One of the staff remarked that he wondered if the jaundice which was such a nuisance in their wards could have the same origin. Inquiry showed that there had been very few cases of jaundice in the general surgical wards of that hospital. Most of the orthopædic patients in this department had compound fracture of the femur and in consequence had to be kept at least three months before they could be evacuated. The general surgical cases were not kept so long but were usually in long enough to cover the ordinary incubation period of infective hepatitis (if this is taken to be about thirty days). Most of the cases of fractured femur received one or more courses of penicillin. Pressure of work in the department was at one time so high that as many as 60 patients were having an injection of penicillin every three hours. It will readily be appreciated what this means as regards equipment and organisation to ensure sterility. At this time they had no central sterilising-room, and it was impossible to boil the syringes and needles between each injection on the wards. Unfortunately this unit did not always record on the hospital cards the fact that a patient developed jaundice, nor was such an observation usually made on the follow-

up cards after the patient had been evacuated. This was due to the fact that the possible relationship had not been realised, and they were only interested in orthopædic complications. However, evidence was obtained of 10 patients who developed jaundice before evacuation and after one or more courses of penicillin. The surgeons and nurses were certain that they had in fact had considerably more than 10 cases.

On the clinical side, as stated above, we formed the impression that these cases were definitely more severe than the ordinary cases of infective hepatitis being admitted at the same time. However, there were no deaths or any serious complications, and there is no reason to suppose that they were any worse than the severe cases often seen during the past three years. Sixteen consecutive cases were analysed as follows :

Severe	10	Moderate	2
Moderately severe ..	3	Mild	1

The incubation period varied but was always much longer than is usually seen in cases of infective hepatitis in which an estimate can be made. It was not always possible to be sure of the date of probable infection, because the course for syphilis may last 7–10 days ; some patients have more than one course in a short time, and infection may be transmitted during the taking of blood for a blood-test. However, in most instances it was estimated to be 2–4 months and occasionally a little longer ; in one instance it was 156 days.

The conclusion from these observations must be that infective hepatitis is being transmitted by faulty technique in administering penicillin parenterally. It is reasonable to assume that this state of affairs is similar to that previously described by other workers following injections of arsenic for syphilis and is a variety of homologous-serum jaundice. It is clear that the danger is not yet sufficiently appreciated, and it seems advisable that further warning should be given to all clinics and institutions where many blood-tests are made and injections given. The setting up of a central supply-room for sterilised equipment would do much to cover this problem, even as it has already proved so beneficial in many minor surgical procedures outside the operating-theatre.

St. Thomas's Hospital. RICHARD TURNER.

SALARIES OF LECTURERS IN MORBID ANATOMY

SIR,—A number of teaching appointments in university medical schools have recently been advertised. The highest salary that I have seen advertised for a lecturer in morbid anatomy is £600 p.a., while the salaries of equivalent appointments in bacteriology, clinical pathology, medicine, and orthopædics are £800, £900, £900, and £1250 respectively and prospects of private practice are offered to the last-named. A relatively large number of morbid anatomists volunteered for the Services in the war and have been required to do bacteriology, biochemistry, and clinical pathology. The work is considered by the Army authorities as relatively simple compared with morbid histology, which only specialists in that line are required to do. In addition, the morbid anatomist has often been given no opportunity to do his own work—indeed, when the War Office wanted medical museum specimens they flew a civilian to Italy and Holland, despite that fact that many of us were unemployed at the time.

The majority of morbid anatomists in the Services are now coming home—Glasgow University has seven returning—and almost all will have to look for appointments elsewhere. Surely they deserve equal treatment with bacteriologists and clinical pathologists, and better treatment than those who took their civil appointments temporarily and used the opportunity to study for other specialties—e.g., gynæcology and medicine. My earnings in the first three years as a civil morbid anatomist totalled £775. I find that the temporary holders of my appointment started at £650 p.a. I have higher degrees and numerous publications to my name, of which my successors have had none. Shorn of war-time increments I would return to a salary of £475 p.a. Should I not be offered my temporary successor's £650, plus an increment for experience and qualifications, and should not my temporary successor enter the R.A.M.C. now to facilitate the class B release of some of my colleagues ?

MORBID ANATOMIST, R.A.M.C.

PENICILLIN IN PARATYPHOID FEVER

SIR,—Enteric organisms are usually considered insensitive to penicillin, but *Bacterium typhosum* obtained by Jordan and Eversley [1] in an outbreak in Normandy was found to be sensitive to large concentrations in vitro. Consequently, when six cases of paratyphoid B, infected by the same carrier and diagnosed by blood-culture, were recently admitted to this hospital, we decided to try the therapeutic effect of large doses of penicillin, although the organisms have subsequently been shown not to be sensitive in vitro to lower concentrations than 400 units per c.cm. The cases were divided into three pairs, graded according to severity, and the iller of each pair was treated with penicillin, 100,000 units intramuscularly three-hourly for three days and subsequently 50,000 units until clinically satisfactory. Treatment was begun on the ninth day of illness in each case. Results are summarised here :

Case	Total dosage of penicillin (units)	Fever				Toxicity			
		Initial	Maximum	Day when maximum	Duration, days	Initial	Maximum	Day when Maximum	Duration, days
1	4,700,000	103·8°	104·4°	12	24	+ + + +	+ + + +	Init.	21
2	Control	103·6°	104·4°	11	31	+ +	+ + +	11	27
3	3,850,000	102·8°	103·6°	12	19	+ +	+ +	Init.	17
4	Control	103·6°	103·6°	7	16	+ +	+ +	—	12
5	3,000,000	100·8°	101°	11	12	+ +	+ +	—	12
6	Control	102·4°	103·8°	14	24	+	+	—	18

Init. = Day on which treatment begun. Other figures indicate day of disease.

Averages.—Duration of pyrexia in penicillin-treated .. 18·3 days.
Duration of pyrexia in controls .. .. 23·6 days.
Duration of toxicity in penicillin-treated .. 16·6 days.
Duration of toxicity in controls .. .. 19·0 days.

When penicillin was begun case 1 was extremely ill, being weak, comatose, and incontinent. At this stage he was very much more ill than his control, but within a few days he had improved dramatically. However, on the 10th and 15th day of illness both he and the control were given a blood-transfusion, each receiving ½ pint from the same donor. Unfortunately, though case 1's transfusions were uneventful, case 2 reacted badly and on each occasion the transfusion had to be stopped. Again, case 5 had received his T.A.B. some 5 months previously, as compared with 14 months in his control. These examples illustrate the number of variables which may invalidate figures based on a small series, but we are recording our findings in the hope of stimulating other workers to a more extended trial when occasion offers.

We wish to thank Colonel V. C. Verbi for permission to publish these cases and Brigadier R. E. Tunbridge, consultant physician, B.A.O.R., for his interest.

J. W. CROFTON.
B.A.O.R. A. M. TURNER.

NEW REMEDY FOR LUPUS

SIR,—Your annotation of Jan. 5 contains a statement which does not accord with known facts ; its implications will almost certainly give rise to misunderstanding and confusion in the practical application of this remedy, and for that reason should be corrected. I refer particularly to the sentence : " Unlike the natural vitamin D_3, obtained from fish-liver oils, calciferol is prepared artificially by irradiating a vegetable sterol, ergosterol, and preparations may include other toxic by-products of irradiation."

In the first place, it is now recognised that any distinction such as that implied by the term " the natural vitamin D_3 " is unwarranted ; both vitamin D_2 and vitamin D_3 occur naturally, in fish-liver oil, and both are prepared synthetically, one by irradiation of ergosterol and the other by irradiation of 7-dehydrocholesterol. That there is no scientific basis for the suggestion that the vitamin D in fish-liver oil is free from associated products of irradiation is a fact, but of minor importance.

1. *Lancet*, 1945, ii, 333.

The really serious source of misunderstanding is the clear suggestion that synthetic calciferol preparations are relatively more toxic than preparations of vitamin D from natural sources. In this country it is common practice in the manufacture of vitamin-D preparations to employ pure crystalline calciferol from which all toxic products of irradiation have been removed. In the present state of knowledge, no other material could provide a greater vitamin-D activity with less toxicity. This does not apply to the United States, where crude irradiated ergosterol is still in common use.

The treatment described can be carried out conveniently only with a preparation of high potency. Any such preparation generally available in this country—including, we believe, the preparation used in the work under discussion—would almost certainly represent pure calciferol. It would at least be quite simple to check this fact by reference to the makers. On the other hand, we know of no preparation obtained from natural sources having a potency sufficiently high to suit the purpose.

Greenford, Middlesex. J. T. MARSH.

LONDON AS POSTGRADUATE CENTRE

SIR,—We have read with interest the admirable letter last week from Prof. W. C. W. Nixon on the needs of the medical postgraduate; with the general spirit of his observations we desire to associate ourselves. There is one point, however, on which we feel that a word must be said. Dr. Nixon quotes Professor Grey Turner as having pleaded for the establishment of a Central Bureau of Medical Information and goes on to welcome the proposed establishment of a world centre for postgraduate training in London.

To those of us who have given a considerable proportion of our time and energy to the activities of the Fellowship of Medicine, a body established in 1919 by the energy and initiative of Sir Arbuthnot Lane, Sir StClair Thomson, and Sir John Macalister, and constituting just such a Central Bureau of Information as is desired, Professor Grey Turner's plea was really heart-breaking. By the end of 1943 a total of over 11,000 postgraduates had taken advantage of the facilities obtained through the offices of the fellowship, and the total number of tickets issued for postgraduate courses *arranged by the fellowship* was over 16,000. During the whole of the most difficult period of the war, when absence of our regular teachers and the obstacles imposed by bombing and blackout made work and organisation well-nigh impossible, the Fellowship of Medicine kept its head above water and still continued to provide information and assistance for those (and there were not a few) who sought its help. Our best and unsolicited testimonials have come from members of the profession in the Dominions, who have been among our best friends and who have looked and still look to us as liaison officers between them and the hospitals of the mother country.

In view of the 27 years of experience which this bureau has had, is it too much to expect that in the planning of future postgraduate work it should at least receive some recognition of its existence by the political planners of today?

MAURICE DAVIDSON,
Hon. Secretary and Chairman of Executive Committee.

Fellowship of Postgraduate Medicine, 1, Wimpole Street, London, W.1.

CHARLES D. READ,
Hon. Treasurer.

GRAM-POSITIVE

SIR,—Your annotation of Jan. 12 refers to recent important work by H. H. Stacey and others on the gram-positive constituent in bacteria. Unfortunately, owing to illness, I have not had opportunity to acquaint myself with the details of their investigation. But may I, in justice to the past, venture to recall the fact that, so long ago as 1911 my lamented colleagues G. Dreyer and S. G. Scott and I published the fact that the gram-positive substance, whatever it may be, could be washed out of bacteria (e.g., by ether), rendering them gram-negative, and could, from the extract so obtained, be washed into naturally gram-negative organisms, rendering them gram-positive.[1]

It is a great pleasure to learn that new light is now being thrown on these old observations.

Upavon, Wilts. E. W. AINLEY-WALKER.

1. *J. Path. Bact.* 1911, **16**, 116.

Medical Diary

Jan. 20 to 26

Tuesday

UNIVERSITY OF LONDON
5.15 P.M. (University College, Gower Street, W.C.1) Mr. F. Bergel, PH.D.: Prosthetic Compounds. (Second of five lectures.)

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.
4.15 P.M. *Pathology* (Lister Institute, Chelsea Bridge Road, S.W.1). Demonstration.

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1.
5.30 P.M. Mr. R. M. Handfield-Jones: Infections of the Hand. (Lectures for demobilised medical officers.)

UNIVERSITY OF EDINBURGH
5 P.M. (Pollock Memorial Hall, Bristo Street, Edinburgh) Dr. Douglas Guthrie: The Search for a Philosophy of Medicine. (Introductory lecture.)

Wednesday

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW, 242, St. Vincent Street.
4 P.M. Prof. Harry Platt: Localised Cystic Lesions. (James Watson lecture.)

Thursday

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.2.
5 P.M. Mr. C. H. Gray: Sciatica. (Hunterian lecture.)

SOCIETY OF THORACIC SURGEONS OF GREAT BRITAIN AND IRELAND.
3 P.M. (Royal College of Surgeons). Dr. Clarence Crafoord: Coarctation of the Aorta and its Surgical Treatment.

MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, W.1) Mr. V. Zachary Cope and Judge Earengey, K.C.: Medicolegal Aspects of Damages for Shock.

ASSOCIATION OF SCIENTIFIC PHOTOGRAPHY
6 P.M. (B.M.A. House, Tavistock Square, W.C.1) Dr. R. B. Billings: Medical Photographer or Photographing Medico.

Friday

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS, 58, Queen Ann Street, W.1.
5 P.M., Dr. Leonard Colebrook, F.R.S.: Looking Backwards and Forwards—Control of Infection in Obstetrics. (Blair-Bell lecture.)

ROYAL SOCIETY OF MEDICINE
3 P.M. *Epidemiology and State Medicine.* Dr. Charles Hill: Popular Health Education.
4.30 P.M. *Disease in Children.* Mr. and Mrs. A. W. G. Ewing: Disorders of Hearing in Relationship to General Health in Childhood.

MEDICAL SOCIETY OF LONDON
5.30 P.M. Dr. C. F. Harris: Gastro-enteritis of Children. (Lectures for demobilised medical officers.)

ASSOCIATION OF CLINICAL PATHOLOGISTS
10 A.M. (London Hospital, E.1) Dr. A. G. Shera: Intestinal Spirochætosis. Dr. C. E. Dukes: Bowel Operation Specimens of Carcinoma. Colonel H. E. Shortt: Leishmaniasis. Dr. F. W. Gunz: Transfusion Reactions due to Rh. factor. Dr. W. H. Cant and Dr. H. S. Baar: Auto-immunisation and Iso-immunisation.
5 P.M. Dr. D. Nabarro: Serological Reactions in Congenital Syphilis. Prof. J. McIntosh: Penicillin in Bacterial Endocarditis.

Saturday

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASE
2.30 P.M. (11, Chandos Street, W.1) Major M. H. Salaman, R.A.M.C.: Non-specific Genital Infections.

ASSOCIATION OF CLINICAL PATHOLOGISTS
10 A.M. Dr. A. J. Rhodes: Diagnosis of Virus Diseases. Dr. J. L. D'Silva and Dr. E. C. Turton: Matching the Tints of Carboxyhæmoglobin Solutions. Mr. P. G. Shute, F.R.E.S.: Laboratory Diagnosis of Malaria. Mr. Kenneth Walker: Testicular Biopsy. Dr. Hadley Jackson: Examination of Seminal Fluid.
2.45 P.M. Discussion on Sedimentation Rate (Dr. K. Rogers and Mr. H. B. Salt).

Appointments

FOWLER, W., M.B. Glasg.: asst. M.O. in the V.D. department, Leeds General Infirmary.
HAYES, L. M., M.B., N.U.I.: examining factory surgeon for Garstang, Lancs.
JONES, A. NORMAN, M.B. Lpool, F.R.C.S.: temp. med. superintendent, Whipps Cross Hospital, London, E.11.
LYON, D. M., O.B.E., M.B. Edin.: temp. asst. M.O. for East Sussex.
WALKER, BETTY, M.B. Lond.: asst. M.O. in V.D. department, Leeds General Infirmary.

THE National Council of the Scottish Nationalist Party have asked Dr. W. O. G. TAYLOR to stand as their candidate in the Catheart (Glasgow) by-election. Dr. Taylor, who graduated M.B. at the University of Glasgow in 1934, is surgeon in charge of diathermy at the Glasgow Eye Infirmary. During the war with the rank of major he served as an ophthalmological specialist in the East Africa command.

Notes and News

SOUTH AFRICA'S WAR MEMORIAL

SOUTH AFRICAN troops stationed in North Africa have asked that the war memorial of their country shall be a living one, and after consultations between the government and the national war memorial interim committee it has been decided that the memorial shall take the form of a health foundation. The National War Memorial Health Foundation, as it is to be called, will establish a nutritional research institute to investigate nutritional standards particularly among non-Europeans. The foundation will also help in educating all sections of the population in sound food habits, and it will provide scholarships for research into the promotion of health and the prevention of disease, and bursaries to train personnel for the national health service. An appeal for the fund will soon be launched on a national basis.

SWEDEN HELPS IN EUROPEAN RELIEF

LAST summer Sweden voluntarily accepted 31,000 former slave workers and other war victims found to be in especially bad health on their release from Nazi prison camps. Offered a diet of 4800 calories, they improved rapidly, despite some initial digestive disturbances, and 11,000 adults had returned to their own countries by the end of September. Before repatriation, each person is given an outfit of warm clothing and food for ten days. Babies and children, some of whom appeared to be moribund when they reached Sweden last summer, have made impressive progress, and nearly all are restored to normal health.

Sweden is to extend her relief activities by establishing feeding, clothing and medical centres for children in all zones of Germany and Austria. This action has been organised by the Swedish Red Cross and the Save the Children Society with the support of the Swedish government. A number of feeding centres will be established in Hamburg and the Ruhr, and probably also in Berlin. From the middle of this month, 10,000 Viennese children between 3 and 6 years of age are to receive daily meals for a period of two months.

A REST HOME FOR STUDENTS

MANY university students in Europe have had hard and terrible experiences during the years of German domination: some have been in concentration camps, some have served in underground resistance movements, and some are so much weakened by hardship and lack of adequate food that their health has suffered. The International Student Service has set up a rest home at Combloux, near Mont Blanc, where such exhausted students can rest and recover their strength. The chalet houses 80 students at a time, and they stay 1–3 months; their life is planned by their own committee and they have many opportunities of devising schemes for self-help and for helping fellow students in financial or other difficulties. They get up at 9 A.M., rest from 2 to 4 P.M., and go to bed at 10. During the day they form study circles to examine problems now facing students in Europe—university reform, political issues, and trends of thought in art and literature. They also get up concerts and plays, develop hobbies such as photography, and run a poster news service.

The first annual conference of the I.S.S. since 1939 was held at Combloux last July; students from twelve different countries attended and discussed war and peace, and first experiences of university reconstruction. The I.S.S. hope that student groups everywhere will help to maintain the chalet; £12 will keep a student for a month. Those wishing to help may send contributions to the general secretary, International Student Service, 1, Sloane Square, London, W.1.

FILMS FROM PARIS ON MICROBIOLOGY

IN a short lecture arranged on Jan. 4 by the British Council, Dr. P. de Fonbrune of the Pasteur Institute, Paris, showed a film of the micro-dissection apparatus used there. The preparation of micro-needles and pipettes was illustrated in detail with the pneumatic reduction-control employed, and the delicacy of manipulation possible was well brought out. This demonstration was followed by three short films in which the apparatus was used. The first showed the behaviour of a lancasterella parasite in frog's blood. The second showed the behaviour of amœbæ in the normal state, and with their nucleus abstracted, and finally the effect of transferring the nucleus from one amœba to another from which it had been removed. The third film revealed the habits of a predatory mould which traps nematodes in an explosive ring-grip formed by three hyphal cells. All four films are of teaching value, and we hope the British Council will be able to make them available soon.

PECKHAM

Dr. G. Scott Williamson, speaking at a meeting of the Town and Country Planning Association on Jan. 10, described the development of the Peckham Health Centre. He stressed the importance of the family as a unit. Experience had shown, he said, that in a mixed community 2000 families must be studied to provide examples of every human capability: but if the families belonged to a uniform wage-group, 10,000 must be taken as the minimum. Peckham was an attempt to study the growth of the individual: the development of each member's faculties without restriction had been encouraged; people wanted to develop their capabilities, but preferred to do so without guidance. Periodic physical examinations had been undertaken. When the centre was first opened, 10% had nothing wrong with them, 20% had something wrong and knew it, while the remainder had something wrong of which they had been unaware. Three or four years later, 30% had nothing wrong—an improvement attributed to the development of members' faculties.

Royal College of Surgeons of England

On Jan. 9, before he delivered the Moynihan lecture, Prof. Willem Noordenbos of Amsterdam was admitted to the honorary fellowship of the college, to which he had been elected in 1943 while in captivity under the Germans. On Jan. 10, Sir Henry Dale, O.M., and Sir William Collins were also admitted to the honorary fellowship. The First Lord of the Admiralty presented to Surgeon Lieut.-Commander F. P. Ellis, R.N., the Gilbert Blane medal awarded for his observations on the effect of the thermal environment on the health and efficiency of ships' companies working in the tropics.

At a meeting of the council on Jan. 10, with Sir Alfred Webb-Johnson, the president, in the chair, Prof. F. Wood Jones, F.R.S., was admitted as the first Sir William Collins professor of human and comparative anatomy. It was reported that Sir James Walton would deliver the Hunterian oration for 1947 and Sir Heneage Ogilvie the Bradshaw lecture for 1946.

It was decided to institute a club in the college for fellows, members, licentiates in dental surgery, and members of all the associations linked with the college through the joint secretariat at 45, Lincoln's Inn Fields. It was also decided to hold a meeting of fellows on Wednesday, May 8, at 6 P.M.

The following diplomas were granted jointly with the Royal College of Physicians:

D.P.M.—Arthur Conachy, A. J. F. Crossley, J. E. Duffield, P. E. Sundt, T. G. Williams.

D.L.O.—Frank Badrock, R. V. Blaubaum, Leo Boss, T. McM. Boyle, L. C. Jacobson, Hanus Jelinek, A. E. Khan, H. E. McHugh, W. J. O. Page, W. M. Ritchie.

University of Glasgow

On Jan 12 the following degrees were conferred:

M.D.—A. K. MacRae (with honours); Constance A. C. Ross (with commendation); William McAdam.

M.B., Ch.B.—John Rankin (with commendation); J. M. Adam, J. K. Anderson, James Austin, Elizabeth Boothe, James Buchanan, R. W. Campbell, G. A. Carrachan, D. B. Carruthers, Douglas Clark, D. S. Cranston, J. S. Creighton, Isabella G. M. Cunningham, J. M. Harper, R. R. Houston, Kilpatrick Jack, W. A. Jackson, Matthew Laidlaw, R. M. Lang, J. W. Little, J. A. McCusker, Neil McDougall, J. A. W. Maguire, D. H. Munro, J. D. Nelson, T. C. Nicol, J. H. Noble, J. M. O'Brien, R. H. Park, J. D. Paterson, John Prentice, I. P. F. Rae, J. H. R. Ramsay, William Ramsay, R. C. Robb, J. W. Roberts, William Roy, Betsy D. Scott, W. L. Selkirk, D. C. V. Stewart, Elizabeth Stewart, Thomas Thomson, W. F. Toomey, J. L. F. Wyllie.

The Bellahouston medal was presented to Dr. Thomas Anderson for his M.D. thesis entitled Clinical Studies in Chemotherapy.

University of Edinburgh

Dr. Douglas Guthrie, the newly appointed lecturer in the history of medicine, will deliver an introductory lecture in the Pollock Memorial Hall, Bristo Street, Edinburgh, on Tuesday, Jan. 22, at 5 P.M. He will speak on the Search for a Philosophy of Medicine.

On Friday, Feb. 22, at 5 P.M., at University New Buildings, Teviot Place, Sir Alexander Fleming, F.R.S., will deliver his Cameron prize lecture on Penicillin—its Origin and Use. Sir Howard Florey, F.R.S., delivered his Cameron lecture on Jan. 18 on the Development of Antibiotic Studies.

University of St. Andrews

At recent examinations the following were successful:

FINAL EXAMINATION FOR M.B., CH.B.

D. A. Kerfoot (with commendation); W. K. Bryson, J. H. Burt, Alexander Douglas, I. C. Geddes, Katherine M. Kelly, H. A. F. Mackay, Joan C. Main, W. B. Wallace, and Margaret A. M. Wilson.

National University of Ireland

The Henry Hutchinson Stewart scholarship in mental and nervous diseases for 1945 has been awarded to Dr. D. J. O'Doherty (University College, Dublin).

An Empire Pharmacopœia

Mr. R. R. Bennett, addressing the Pharmaceutical Society on Jan. 10, said that Empire coöperation had been invited to ensure that the new *British Pharmacopœia*, now in preparation, should be suitable for the whole Commonwealth. Supplementary lists might be issued to meet local needs.

Fellowship in Genetics or Mental Health

Radcliffe College, Cambridge, Mass., invites applications for the Helen Putnam fellowship for advanced research in genetics or mental health. The fellowship, which carries a stipend of $2000, is tenable for 11 months, from Oct. 1, 1946, is open to women who have gained their doctorate or possess similar qualifications and who have research in progress. Applications for the award must be sent to Radcliffe College not later than April 1.

Proposed Chair of Psychiatry in Manchester

Plans for a coördinated psychiatric service are announced by the joint hospitals advisory board of Manchester, Salford, and Stretford. The scheme (described in the *Manchester Guardian* of Jan. 9) covers six municipal and voluntary hospitals, and includes the provision of home treatment and child-guidance clinics. It is estimated that 150 beds will be required for psychiatric cases in general hospitals. The board suggests that a chair in psychiatry should be set up by Manchester University, which would assume responsibility for teaching and become the academic centre of the service.

Rushcliffe Scale for Midwives and Mental Nurses

The Minister of Health has informed Lord Rushcliffe, chairman of the Nurses' Salaries Committee, the Mental Nurses Sub-Committee, and the Midwives Salaries Committee, that any increases recommended following the review of the salaries of mental nurses and midwives now taking place will have effect as from Jan. 1, 1946.

Chadwick Lectures

The following public lectures have been arranged for the next half-year: Dr. A. G. G. Thompson, Land Utilisation in Relation to the Public Health (Feb. 19, 2.30 P.M., at 26, Portland Place, London, W.1); Dr. S. A. Henry, Medical Service in Industry (March 5, 4.30 P.M., University of Sheffield, Western Bank, Sheffield, 10); Mr. D. Winston Aldred, F.R.I.B.A., the New Building Science (April 9, 2.30 P.M., 90, Buckingham Palace Road, S.W.1); Major Eyre Carter, the Rehabilitation of Stateless Persons and its Hygienic Bearings (May 7, 2.30 P.M., Caxton Hall, S.W.1); Miss Ellen Delf, D.SC., Plants in the Service of Mankind (June 20, 4 P.M., Chelsea Physic Garden, S.W.3). Further information may be had from the secretary of the trust, 204, Abbey House, Westminster, S.W.1.

Socialist Medical Association

During its health services week the association is holding 14 public meetings and an exhibition illustrating the battle for health. The first public meeting will be held at the Royal Opera House, Covent Garden, London, W.C.2, on Feb. 2, at 3 P.M., when the speaker will be Mr. James Griffiths, the Minister of National Insurance; and Mr. Aneurin Bevan, the Minister of Health, will wind up the series at Friends Meeting House, Euston Road, N.W.1, on Feb. 9, at 3 P.M. The exhibition and other meetings will be held at Livingstone Hall, 66, Broadway, S.W.1, and the medical speakers will include Mr. Somerville Hastings, M.P., Lieut.-Colonel Main, R.A.M.C., Mr. A. W. Bourne, Prof. J. R. Marrack, Prof. J. M. Mackintosh, Dr. Horace Joules, Dr. Stark Murray, Dr. J. Powell-Evans, and Dr. Joan McMichael. Further information may be had from the secretary of the association, 35, Long Acre, W.C.2.

Dried Bananas

The Minister of Food announces that it has been found necessary to terminate the arrangements made with the War Organisation of the British Red Cross Society and Order of St. John of Jerusalem for the supply of dried bananas free of cost to patients with steatorrhœa (including cœliac disease and tropical sprue). The Ministry has arranged that Messrs. Mapleton's Nut Food Co. Ltd. (Garston, Liverpool 19) shall supply dried bananas direct to these patients at the rate of 14 lb. per month and at the cost of 9½*d.* per lb. post free. Applications should be supported by a medical certificate, and 11*s.* 1*d.* should be enclosed. Further supplies may be had monthly without a fresh certificate.

Nurses' Gift to Unrra

The nursing staff of Lewisham Hospital has sent a cheque for £130 to UNRRA for medical relief work.

Return to Practice

The Central Medical War Committee announces that Dr. A. W. SPENCE has resumed civilian practice at 47, Queen Anne Street, London, W.1.

King Edward's Hospital Fund for London

The King has sent an annual subscription of £1000 to the fund.

Pharmaceutical Society of Great Britain

The Privy Council has nominated Dr. Bertram A. Young, medical superintendent of St. Alfege's Hospital, L.C.C., to the council of the society in place of Sir Walter Langdon-Brown who has resigned.

R.A.M.C. (T.A.) Reunions

The 140 County of London field ambulance have formed an old comrades' association for all pre-war and war-time members. They meet on the first Friday of every month at 7 P.M. at the central mess, Duke of York's Headquarters, Chelsea. All officers and other ranks of 140 field ambulance, 13/4 London general hospital, 141 field ambulance, the 8th field hygiene section, and any affiliated units will be welcome at these meetings.

Summer School in Health Education

The Central Council for Health Education will hold a residential summer school at Somerville College, Oxford, from Aug. 14 to 28. The directors of the school will be Miss D. E. M. Gardner, head of child development department, University of London Institute of Education, and Dr. Robert Sutherland, medical adviser and secretary to the council. The school is intended for those who have to do with the training and care of children and young people—including health visitors, school nurses, educational and medical administrators, and welfare superintendents. Further information may be had from Dr. Sutherland at the council's offices, Tavistock House, Tavistock Square, London, W.C.1.

Society for Relief of Widows and Orphans of Medical Men

At a meeting of the directors on Jan. 2, with Dr. R. A. Young, the president, in the chair, it was reported that £15 had been sent at Christmas to each of the 55 widows in receipt of grants. £1940 was voted for the payment of the half-yearly grants. Members who have been serving in H.M. Forces and have now returned to private practice, are asked to send their present address to the secretary at 11, Chandos Street, London, W.1. Relief is granted only to the widows and orphans of deceased members. Membership is open to any registered practitioner living within 20 miles of Charing Cross.

Births, Marriages, and Deaths

BIRTHS

DENNY-BROWN.—On Jan. 9, at Lewes, Sussex, the wife of Brigadier D. Denny-Brown, R.A.M.C.—a son.

TRAINER.—On Jan. 8, the wife of Dr. L. Trainer, L.D.S., of Kelso—a son.

MARRIAGES

ATTENBOROUGH—MANSBRIDGE.—On Dec. 26, at Peshawar, India, John Attenborough, captain R.A.M.C., to F. Mansbridge, sister, P.M.R.A.F.N.S.R.

BARLING—GARTHWAITE.—On Jan. 5, at Guildford, Gilbert Michael Barling, captain R.A.M.C., to Dorothea Garthwaite.

KAULA—KNOWLES.—On Dec. 27, at Trincomalee, Ceylon, Charles V. Kaula, surgeon lieutenant R.N.V.R., to Pamela Knowles.

LADKIN—BONHAM-SMITH.—On Dec. 29, at Kampala, Uganda, Ronald Greaves Ladkin, B.M., Colonial Medical Service, to Dorothy Heloise Bonham-Smith, Colonial Nursing Service.

ROOK—WILSON.—On Jan. 8, at Amersham, Alan Filmer Rook, C.B., O.B.E., F.R.C.P., air vice-marshal, to Elizabeth Wilson.

TAYLOR—WATSON.—On Jan. 9, at Buxton, John Wentworth Taylor, surgeon lieutenant R.N.V.R., to Evelyn Margaret Watson.

DEATHS

ATKINS.—On Jan. 10, at Glasgow, Thomas Richard Webster Atkins, O.B.E., L.R.C.P.E., senior surgeon, Merchant Navy.

GORE.—On Jan. 10, at Colchester, William Crampton Gore, M.B. Dubl.

JAMES.—On Jan. 5, at Aberystwyth, Walter Timothy James, M.D. Edin., of Newquay, Cards., aged 67.

MARRIAGE.—On Jan. 12, at Woldingham, Surrey, Herbert James Marriage, M.B. Lond., F.R.C.S., aged 73.

PEVERLEY.—On Jan. 9, at Farnham, Surrey, Walter Augustus Peverley, M.B. Durh., formerly of Durban, South Africa.

SUTHERLAND.—On Jan. 10, at Ealing, Donald George Sutherland, M.A. Camb., M.B., B.SC. Edin., aged 82.

WHITELOCK.—On Jan. 8, at Oxford, Hugh Anthony Bulstrode, M.CH. Oxfd, F.R.C.S., aged 54.

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Successful immunisation against diphtheria depends upon a number of factors: choice of a suitable prophylactic; correct dosage; proper spacing of injections; and—most important of all—*the efficiency of the antigen.* It is now recognised that this property may vary considerably in prophylactics manufactured by different processes, and that some variation may occur even between preparations produced by the same method. Constant research has been carried out at The Wellcome Physiological Research Laboratories with the object of improving and controlling antigenic efficiency and removing non-specific proteins.

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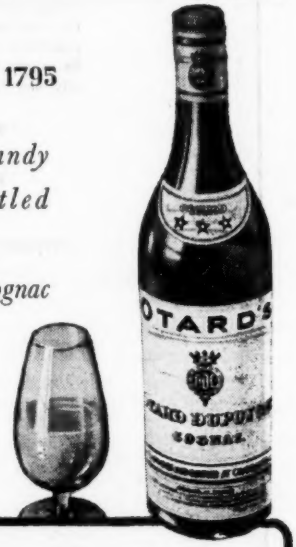

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STATEMENT OF ACCOUNTS. 31st December, 1945

LIABILITIES	£	£
Current, Deposit and other Accounts	996,749,766	
Balances in account with Subsidiary Banks	11,201,703	
		1,007,951,469
Acceptances, Guarantees, Indemnities, etc., for account of Customers		14,678,163
Paid-up Capital		15,858,217
Reserve Fund		11,250,000

ASSETS		
Cash in Hand and with the Bank of England		111,690,130
Balances with other British Banks and Cheques in course of collection		37,528,121
Money at Call and Short Notice		41,954,200
Bills Discounted		95,508,900
Treasury Deposit Receipts		345,000,000
Investments		220,440,878
Investment in Industrial and Commercial Finance Corporation Limited:—		
2,638 Shares of £1,000 each, £100 paid up		263,800
Investments in Subsidiary Banks (at cost, *less* amounts written off):—		
The British Linen Bank—£1,242,295 5s. 0d. Stock		3,726,886
Other Banks—(including fully paid Stock and 500,000 "B" Shares of £5 each, £1 per Share paid up, in Barclays Bank (Dominion, Colonial and Overseas) and 1,000,000 Shares of £1 each, 5s. per Share paid up, in Barclays Bank (France) Limited)		2,494,335
Advances:—Customers and other Accounts	167,778,807	
Balances in account with Subsidiary Banks	745,005	
		168,523,812
Liability of Customers for Acceptances, Guarantees, Indemnities, etc.		14,678,163
Bank Premises and Adjoining Properties (at cost, *less* amounts written off)		7,928,624

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Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

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For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

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FINAL EXAMINATION: SURGERY, 11th March, 8th April, 13th May, 1946. MEDICINE, PATHOLOGY, 18th March, 15th April, 20th May, 1946. MIDWIFERY, 19th March, 16th April, 21st May, 1946. MASTERY OF MIDWIFERY EXAMINATIONS, May and November.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

ROYAL FREE HOSPITAL, Gray's Inn-road, London, W.C.1. The following appointments to the Honorary Medical Staff will become vacant on 1st July next:—

1 OPHTHALMIC SURGEON.
1 ORTHOPÆDIC SURGEON.
1 OBSTETRICIAN AND GYNÆCOLOGIST.
1 NEUROSURGEON.
1 ASSISTANT SURGEON.

Applications, including those from members of H.M. Forces, are invited for the above-mentioned posts. Candidates should be Fellows of the Royal College of Surgeons of England and on the Medical Register.

Applications should be supported by such relevant details as the applicant thinks fit to provide, with the names of 3 persons to whom reference may be made, and should be sent to the undersigned, from whom further details of the appointments can be obtained, not later than 31st May, 1946.

RICHARD T. BARTLEY, Secretary.

ROYAL FREE HOSPITAL, Gray's Inn-road, London, W.C.1. Applications are invited from registered medical practitioners for the whole-time appointment of RESIDENT ANÆSTHETIC REGISTRAR (B1) for 1 year at Three Counties Hospital, Arlesey, Beds. Applicants must not be more than 10 years qualified. Minimum salary £350 p.a. Duties to commence from date of appointment. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age and accompanied by copies of 3 recent testimonials, should be sent on or before 26th January to: RICHARD T. BARTLEY, Secretary.

THE QUEEN ELIZABETH HOSPITAL FOR CHILDREN. (Incorporating THE QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, E.2, and THE PRINCESS ELIZABETH OF YORK HOSPITAL FOR CHILDREN, Shadwell, E.1.) Applications are invited from Men and Women, including those now serving in H.M. Forces, for the post of MEDICAL REGISTRAR, full-time and non-resident, at Hackney-road and Shadwell. Candidates must have had experience in pædiatrics and the M.R.C.P. will be an advantage. Salary £500 p.a. Appointment for 12 months, renewable for a second year.

Applications, with testimonials, should reach the undersigned not later than 31st January, 1946. CHARLES H. BESSELL, Hackney-road, E.2. General Secretary.

ST. THOMAS'S HOSPITAL, London, S.E.1. Applications, including those from practitioners serving in H.M. Forces, are invited for the following appointments:—

HONORARY OBSTETRIC PHYSICIAN. The present Obstetric Physician to Out-patients is eligible, and if he is appointed there will be a vacancy for an Honorary Obstetric Physician to Out-patients.

HONORARY ORTHOPÆDIC SURGEON. The present Assistant Orthopædic Surgeon is eligible, and if he is appointed there will be a vacancy for an Honorary Assistant Orthopædic Surgeon.

HONORARY PLASTIC SURGEON.

Candidates for the above appointments must be Fellows of the Royal College of Surgeons.

DIRECTOR OF RADIOTHERAPY. Salary at the rate of £1000 p.a. The present Temporary Director is eligible.

HONORARY DENTAL SURGEON.

HONORARY ASSISTANT DENTAL SURGEON.

Applications should be sent by 20th April, 1946, to R. PELHAM BORLEY, Clerk of the Governors, from whom further details can be obtained.

HAMPSTEAD GENERAL HOSPITAL, The Green, N.W.3. The Council of Management invites applications from registered medical practitioners for the full-time post of TEMPORARY PATHOLOGIST. The salary of this temporary appointment will be according to experience and qualifications within the range of £800 to £1000 p.a. The holder will be permitted to use the Laboratory for pathological work for private patients, the salary being augmented by one-half of the fees arising therefrom. Fees arising from consultations only are to be retained wholly by the holder. The appointment will be held at the pleasure of the Council but will be subject to 3 months' notice of termination on either side. Duties to commence 1st March, 1946.

Applications on the prescribed forms, with copies of 3 testimonials, to reach the undersigned by the 12th February, 1946.

KENNETH A. F. MILES, House Governor.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. Applications are invited from registered medical practitioners for the appointment of Male RESIDENT SURGICAL HOUSE OFFICER (B1), vacant 1st February, 1946. Applicants should have held house appointments and had surgical experience. Salary is at £350 p.a. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age, qualifications with dates, experience and details of previous appointments, with copies of recent testimonials, to be sent immediately to—

F. A. LYON, Administrator and Secretary.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich. The Committee of Management of the Seamen's Hospital Society invite applications for the post of HONORARY ASSISTANT PHYSICIAN from Fellows or Members of the Royal College of Physicians of London.

Applications, stating age and particulars of previous appointments, with names of not more than 3 referees, to be sent to the undersigned on or before 1st June, 1946. The vacancy has been notified to the Directors of Medical Services, H.M. Forces.

F. A. LYON, Administrator and Secretary.

Greenwich, January, 1946.

ST. JOHN'S HOSPITAL, Lewisham, S.E.13. Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant 1st February, 1946. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £350 p.a. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age, nationality, qualifications with dates, experience and details of previous appointments, together with copies of recent testimonials, should be sent to—

J. C. GILBERT, Secretary-Superintendent.

ST. JOHN'S HOSPITAL, Lewisham, S.E.13. Applications are invited from registered medical practitioners, Male or Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for appointment of CASUALTY OFFICER (A). The appointment is for 6 months from 1st February. Salary at the rate of £150 p.a., with full residential emoluments.

Applications, with copies of testimonials, should be sent as soon as possible to: J. C. GILBERT, Secretary-Superintendent.

THE ROYAL CANCER HOSPITAL (FREE) (Incorporated under Royal Charter), Fulham-road, London, S.W.3. Applications are invited from duly qualified medical Men for the post of ASSISTANT DIRECTOR of the Radiotherapy Department. The appointment is a full-time one, and the commencing salary will be at the rate of £1000 p.a. The Assistant Director shall devote his whole time to the work of the department, but this shall not preclude him from accepting approved Examinerships and Lectureships. He shall be permitted private practice provided that this is conducted in the Hospital. He shall take part in the teaching of radiotherapy and radiography. He shall be granted facilities for research work and will be expected to do everything in his power to promote and advance the study of radiotherapy particularly in relation to cancer and allied diseases.

Applications, to be made on a form which will be supplied by the Secretary, together with copies of 3 recent testimonials, should be sent not later than the first post on Saturday, 4th May, 1946, to: VICTOR H. PINKHAM, Secretary.

THE ROYAL CANCER HOSPITAL (FREE) (Incorporated under Royal Charter), Fulham-road, London, S.W.3. Applications are invited from duly qualified medical Men for the post of DIRECTOR of the X-ray Diagnostic Department. The appointment is a part-time one and involves attendances on 5 half-day sessions a week. The salary will be at the rate of £750 p.a. The Director shall be entitled to receive fees for work carried out in connexion with private patients attending the Hospital under other members of the staff, but shall not be permitted to see private patients referred to him direct from outside sources. The teaching of X-ray diagnosis shall form an important part of his duties.

Applications, to be made on a form which will be supplied by the Secretary, together with copies of 3 recent testimonials, should be sent not later than the first post on Saturday, 4th May, 1946, to: VICTOR H. PINKHAM, Secretary.

THE ROYAL CANCER HOSPITAL (FREE) (Incorporated under Royal Charter), Fulham-road, London, S.W.3. Applications are invited from duly qualified medical Men for the post of DIRECTOR of the Pathology Department. Experience in clinical pathology essential. Salary £1250 p.a. The appointment is subject to rules, a copy of which can be obtained from the Secretary.

Applications, to be made on a form which will be supplied by the Secretary, together with copies of 3 recent testimonials, should be sent not later than the first post on Saturday, 4th May, 1946, to: VICTOR H. PINKHAM, Secretary.

THE ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. Applications are invited from registered medical practitioners, Female, for the posts of HOUSE PHYSICIAN (A) and HOUSE SURGEON (A), vacant 1st March, 1946. Appointments for 6 months. Salary at the rate of £100 p.a., with full residential emoluments.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary by 2nd February.

THE ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. At OSTER HOUSE E.M.S. HOSPITAL, ST. ALBANS. Applications are invited from registered medical practitioners, Female, for the posts of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A), vacant 1st March, 1946. Appointments will be for a period of 6 months. Salary at the rate of £115 p.a., with full residential emoluments.

Applications, with 2 copies of 3 recent testimonials, should be sent to the Secretary of the Elizabeth Garrett Anderson Hospital by 2nd February.

CHARING CROSS HOSPITAL. Applications are invited for the post of HONORARY CLINICAL ASSISTANT to the Psychological Medicine Department. Honorarium £50 p.a.

Applications, together with copies of 3 recent testimonials, should be sent not later than 19th February, 1946, to—

GEORGE J. JONES, Secretary.

Charing Cross Hospital, Agar-street, Strand, W.C.2.

CHARING CROSS HOSPITAL. Applications are invited for the post of HONORARY ASSISTANT DIAGNOSTIC RADIOLOGIST. Candidates must possess a recognised diploma in Radiology.

Applications, accompanied by copies of 3 recent testimonials, should be sent not later than 23rd April, 1946, to—

GEORGE J. JONES, Secretary.

Charing Cross Hospital, Agar-street, Strand, W.C.2.

THE QUEEN ELIZABETH HOSPITAL FOR CHILDREN, Hackney-road, E.2. Applications are invited from registered medical practitioners, Male and Female, including R practitioners now holding A posts, for the appointment of HOUSE SURGEON CASUALTY OFFICER (B2), vacant 1st March, 1946. Appointment will be for 6 months. Salary at rate of £150 p.a.

Application forms may be obtained from the undersigned and should be returned, with copies of not more than 3 testimonials, on or before 6th February, 1946.

CHARLES H. BESSELL, General Secretary.

THE QUEEN ELIZABETH HOSPITAL FOR CHILDREN, Hackney-road, E.2. Applications are invited from registered medical practitioners, Male and Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for the appointment of HOUSE PHYSICIAN (A), vacant 1st March, 1946. Appointment will be for 6 months. Salary at the rate of £150 p.a., with full residential emoluments.

Application forms may be obtained from the undersigned, and should be returned, with copies of not more than 3 testimonials, on or before 6th February, 1946.

CHARLES H. BESSELL, General Secretary.

METROPOLITAN HOSPITAL, Kingsland-road, E.8. Full-time BIOCHEMIST (Man or Woman) required for work in the Pearson Cancer Research Laboratory. Duties to commence early May. Salary £800 to £1200 p.a., according to experience and qualifications.

Particulars from—

FRANK CHAMBERS, House Governor and Secretary.

HIS MAJESTY'S COLONIAL SERVICE

THE COLONIAL MEDICAL SERVICE

VACANCIES FOR MEDICAL OFFICERS

General recruitment for the Colonial Medical Service has been resumed. There has been little recruitment during the war and as a result vacancies have to be filled, both to replace normal wastage and to provide staff for expansion. The Secretary of State for the Colonies invites applications from doctors who are British subjects and possess a medical qualification registrable in the United Kingdom.

Medical Officers are appointed in the first instance for general service, but there are ample opportunities for work in special branches of medicine and surgery, in public health and in medical research.

The normal salary scale is from £600 to between £1000 and £1150. There are large numbers of super-scale posts to which promotion is made on merit and which carry higher salaries. The large majority of Colonial Governments have agreed to allow credit for war service in fixing the point at which selected candidates will enter the salary scale. The intention of this concession is to meet the cases of candidates who, by reason of war service, enter the Colonial Service at a later age than is normal.

All officers appointed to permanent posts in the Colonial Service between the outbreak of war and a post-war date to be fixed by the Secretary of State for the Colonies will be regarded as having entered the Service in a single group. Seniority as between themselves in an individual Colony will be reckoned by age.

Government quarters, in many cases free of rent, and first-class passages to and from the Colonies are provided, and an adequate pension scheme is in force.

Selected candidates are normally required to attend a course of instruction in Tropical Medicine and Hygiene, either before proceeding overseas or during their first leave period.

Further particulars, including the regulations governing admission to the Colonial Medical Service, may be obtained from the Director of Recruitment (Colonial Service), 15, Victoria-street, London, S.W.1.

THE LONDON CHEST HOSPITAL, E.2. Applications are invited for the post of RESIDENT MEDICAL OFFICER (B1) at the Hospital's country branch at Camberley, Surrey, as from 1st April, 1946. The appointment is for 6 months. Salary at the rate of £350 p.a., with board and lodging. Suitably qualified R practitioners holding B2 posts, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications to be sent not later than Saturday, 23rd February, 1946, to: THOS. BROWN, Secretary.

ST. BARTHOLOMEW'S HOSPITAL, E.C.1. Notice is hereby given that a meeting of the Election Committee will be held on Tuesday, 7th May, 1946, at 4 o'clock in the afternoon, to elect a NEUROLOGIST to the Hospital.

Candidates, who must be Fellows or Members of the Royal College of Physicians of London, are required to lodge 50 copies of their applications and testimonials with the undersigned on or before Saturday, 27th April, 1946.

C. C. CARUS-WILSON, Clerk to the Governors.

14th January, 1946.

UNIVERSITY OF LONDON. The Senate invite applications for the READERSHIP IN PHARMACOLOGY tenable at Guy's Hospital Medical School (salary not less than £800).

Applications must be received not later than first post on 19th May, 1946, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars should be obtained.

METROPOLITAN BOROUGH OF BETHNAL GREEN. The Bethnal Green Borough Council invites applications from persons not over 45 years of age for the appointment of MEDICAL OFFICER OF HEALTH at a commencing salary of £1200 p.a., plus cost-of-living bonus, rising by annual increments of £50 on approved service to a maximum salary of £1400 p.a., plus cost-of-living bonus, inclusive of all services of any kind whatever. Persons who are in whole-time employment and are desirous of making application for this post must first obtain the permission of the Minister of Health through the (Principal) Regional Medical Officer. Candidates must possess the qualifications prescribed by the London Government Act, 1939, and the Sanitary Officers Order, 1926. The appointment has been approved by the Minister of Health, and is subject to the candidate satisfactorily passing a medical examination, and to the Bethnal Green Borough Council Superannuation Acts, and bye-laws and standing orders of the Council.

Applications must be on forms obtained from me, and returned so as to reach me at the Town Hall, Bethnal Green, London, E.2, by NOON on Tuesday, the 21st May, 1946.

December, 1945. S. P. FERDINANDO, Town Clerk.

BRITISH RED CROSS CLINIC FOR RHEUMATISM, London. With a view to widening the field of activity of the B.R.C. Clinic for Rheumatism, the Committee is proceeding to make the appointment of 2 HONORARY VISITING PHYSICIANS from the provinces. Candidates must be Members of the Royal College of Physicians, including practitioners serving with H.M. Forces, and be prepared to assist in the work of the Clinic by visits at least once a fortnight.

Applications, accompanied by 2 recent testimonials or the names and addresses of 2 referees, should be forwarded not later than 19th May, 1946, to: The Administrator, British Red Cross Clinic for Rheumatism, Peto-place, Marylebone-road, London N.W.1.

WEST LONDON HOSPITAL, Hammersmith, W.6. Applications are invited for the post of HONORARY PHYSICIAN FOR PSYCHOLOGICAL MEDICINE. Candidates (Men or Women) should be Members or Fellows of the Royal College of Physicians, London, and should have had some experience in child psychiatry. A Diploma in Psychological Medicine is desirable. The candidate appointed would be expected to undertake at least one out-patient session per week, and such teaching as may be required by the Medical School. The appointment does not carry with it the charge of any hospital beds. Applications from doctors serving in H.M. Forces are also invited.

Applications, accompanied by copies of testimonials, must reach me not later than first post on Monday, 20th May. Candidates must attend a meeting of the Medical Council at 5 P.M., on Tuesday, 21st May, and prior to that date call upon and send copies of their application and testimonials to each member thereof. They must not canvass members of the Board, but nevertheless must send copies of their application and testimonials to each member thereof and, if so notified, be in attendance at a meeting of the Board at 5 P.M. on Thursday, 23rd May, when the appointment will be made.

H. A. MADGE, Secretary.

LONDON HOSPITAL, E.1. Applications are invited for the post of FIRST ASSISTANT AND REGISTRAR (B1) to the Children's Department. The term of appointment is for 1 year, renewable annually on application for 2 further periods of 1 year. The salary is £400 p.a., non-resident, payable by the Hospital and Medical College jointly. Should the candidate be eligible under the Ministry of Health Post-Graduate Training Scheme he will be entitled to salary in accordance with that scheme.

Applications, with 6 copies of testimonials, should be sent to the House Governor (from whom further particulars may be obtained) and must arrive not later than 15th April, 1946.

H. BRIERLEY, House Governor.

MEMORIAL HOSPITAL, Shooters Hill, S.E.18. Applications are invited for the following permanent appointments to the Honorary Medical Staff:—

ASSISTANT PHYSICIAN.	OPHTHALMIC SURGEON.
ASSISTANT SURGEON.	ANÆSTHETISTS (2).
ORTHOPÆDIC SURGEON.	ASSISTANT DENTAL SURGEON.

Members of the Forces are invited to apply. Testimonials are not required but candidates should give the names of 3 persons to whom reference may be made.

Applications should reach the undersigned not later than 19th May, 1946. J. I. COXON INCE, House Governor.

The Memorial Hospital, Shooters Hill, London, S.E.18.

MIDDLESEX COUNTY COUNCIL. Casualty Officer (B2, non-resident) required at Ashford County Hospital, Middlesex. Applications invited from registered medical practitioners who have held house appointments and had good all-round experience (including R practitioners who now hold A posts). Salary £350 p.a., plus non-resident cash allowance of £100 p.a.; additional cost-of-living bonus (now £60 p.a.). Whole-time duties, under Medical Director, will include dealing with casualties and admissions to Hospital and such other duties as may be required. Appointment, subject to medical examination and 1 month's notice, is for 6 months, but may be extended for further 6 months (except R practitioners). Post vacant 1st March, 1946.

Applications, stating age, nationality, qualifications, and experience, enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital. Application forms not provided. Closing date 2nd February, 1946.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

MIDDLESEX COUNTY COUNCIL. Assistant Anæsthetist (B2), resident, required at Central Middlesex County Hospital, Park Royal, N.W.10. Applications invited from registered medical practitioners, including R practitioners now holding A posts, preferably who have held hospital appointments and had anæsthetic experience. Salary £350 p.a., plus cost-of-living bonus (now £60 p.a., proportion only paid in cash). Board, lodging, laundry. Whole-time duties, such as Council may require, under supervision of Medical Director. Appointment, subject to medical examination and 1 month's notice, is for 6 months, with possibility of extension to 12 months (except R practitioners). Post vacant 1st March, 1946.

Applications, stating age, nationality, qualifications, experience, enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital. Closing date 2nd February, 1946. Application forms not provided.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

MIDDLESEX COUNTY COUNCIL. Casualty Officer (B1, resi-dent) required at Redhill County Hospital, Edgware, Middlesex. Applications invited from registered medical practitioners who have held house appointments and had practical surgical and orthopædic experience (including R and W practitioners now holding B2 posts). R practitioners holding B1 posts ineligible unless rejected by R.A.M.C. Salary £350 p.a. Board, lodging, and laundry. Additional cost-of-living bonus (now £60 p.a., proportion only paid in cash). Whole-time duties, under supervision of Medical Director, will include dealing with casualties and admissions to Hospital and such other duties as may be required. Appointment, subject to medical examination and 1 month's notice, is for 6 months, with possibility of extension to 12 months. Post vacant 23rd February, 1946.

Applications, stating age, nationality, qualifications, and experience, enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital. Application forms not provided. Closing date 2nd February, 1946.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

MIDDLESEX COUNTY COUNCIL. Applications are invited for the following established appointments to the senior staff of the Council's Hospitals (at present held in a temporary capacity):—

At Ashford County Hospital, Staines:
PHYSICIAN. SURGEON.

At Central Middlesex County Hospital, Willesden:
PHYSICIAN (with special experience of gastro-enterology).

At Clare Hall County Hospital, South Mimms:
SURGEON (with special experience of thoracic surgery).

At Hillingdon County Hospital, Uxbridge:
PHYSICIAN. OBSTETRIC SURGEON.

At North Middlesex County Hospital, Edmonton:
PHYSICIAN. SURGEON.

At Redhill County Hospital, Edgware:
PHYSICIAN. SURGEON.

Candidates should hold the recognised higher degrees or diplomas in their respective specialties. The general scope of duties, which may include teaching, will be arranged by the Medical Directors of the respective Hospitals. Salary £1200 (plus cost-of-living bonus, now £60 p.a.) by £100 to £1300 p.a.; on proof of outstanding achievement further increments of £50 up to £2200 p.a. may be granted. Salary is inclusive; any fees received to be paid to County Council. Appointments are whole-time and pensionable, subject to medical examination and 3 months' notice. Posts are non-resident but candidates appointed must live near Hospital.

Applications to the undersigned, stating age, nationality, qualifications, and experience, and enclosing copies of not more than 3 recent testimonials. Candidates should indicate, in order of preference, posts for which they desire to be considered. Application forms not provided. Closing date 4th May, 1946.

C. W. RADCLIFFE, Clerk of the County Council.
Middlesex Guildhall, Westminster, S.W.1.

ZOOLOGICAL SOCIETY OF LONDON. Applications are invited for the following posts:—

(1) ASSISTANT SUPERINTENDENT at Regent's Park Gardens. Candidates (Male) should preferably be not more than 35 years of age. A medical degree or qualification is desirable but not essential. Candidates should have a knowledge of zoology and administrative experience. Salary will be determined according to the experience and qualifications of the selected candidate.

(2) PATHOLOGIST AND PARASITOLOGIST. Candidates (Male) should preferably be not more than 35 years of age. A medical degree or qualification and a knowledge of parasitology are necessary. Salary will be determined according to the experience and qualifications of the selected candidate.

Applications, with at least 3 references and copies of any testimonials, must be submitted to the Secretary, Zoological Society of London, Regent's Park, N.W.8, not later than 1st May, 1946.

WEMBLEY HOSPITAL, Wembley, Middlesex. Applications are invited for the post of SENIOR RESIDENT MEDICAL OFFICER (B1), vacant 1st March, 1946, for a period of 6 months. Salary is at the rate of £250 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications should reach the undersigned as soon as possible.
P. E. WINDO, Secretary.

LANCASHIRE MENTAL HOSPITALS BOARD. Applications are invited from registered medical practitioners (including those at present serving with H.M. Forces either at home or abroad) for the 4 vacant posts of DEPUTY MEDICAL SUPERINTENDENT at the County Mental Hospitals, Prestwich (near Manchester), Rainhill (near Liverpool), Whittingham (near Preston), and the Calderstones Certified Institution for Mental Defectives, Whalley (near Blackburn). The salary for each post is £745–£50–£845 p.a. (annual increments), with emoluments valued at £200 p.a. and war bonus (at present £59 16s. p.a.). An additional £50 p.a. is payable in respect of the D.P.M. If the post is held non-resident, the emoluments will be paid in cash. All the posts are whole-time appointments and will be subject to the Asylums Officers' Superannuation Act, 1909.

Application forms and further particulars of the appointments are obtainable from the undersigned, to whom completed applications must be sent, in envelopes endorsed "Deputy Medical Superintendent," so as to arrive not later than Saturday, 13th April, 1946. R. H. ADCOCK, Clerk of the Board.
County Offices, Preston, 1st December, 1945.

WEST HERTS HOSPITAL, Hemel Hempstead. Applications are invited from registered medical practitioners, including those holding A posts, for the post of HOUSE SURGEON (B2), vacant 8th February next. The appointment is for a period of 6 months. The salary is at the rate of £200 p.a., with full residential emoluments. To practitioners within 3 months of qualification the salary will be at the rate of £120 p.a.

Applications, stating age, qualifications with dates, nationality, and present post (if any), and accompanied by copies of 3 recent testimonials, should be sent as soon as possible to—
J. PRICE JONES, Clerk to the Hospital.
11th January, 1946.

THE WARWICKSHIRE KING EDWARD VII MEMORIAL SANATORIUM, HERTFORD HILL, near WARWICK. (239 Beds, Pulmonary Tuberculosis.) Applications are invited for the post of JUNIOR MEDICAL OFFICER (B2) at the above Sanatorium. The appointment will be for 6 months in the first instance. To R practitioners holding A posts, who may also apply, it is limited to 6 months. No previous professional experience necessary. Salary £375 p.a., plus cost-of-living bonus, with full residential emoluments.

Applications to be sent to the Medical Superintendent at the Sanatorium by 7th February, 1946.

L. EDGAR STEPHENS, Clerk to the Joint Committee.
Shire Hall, Warwick.

CITY OF PORTSMOUTH. St. James Hospital for Mental and NERVOUS DISEASE. Applications are invited from suitably qualified practitioners (Male or Female) holding B2 appointments or who have been rejected for H.M. Forces for the post of ASSISTANT PHYSICIAN (B1). The commencing salary for this post is £500 p.a., plus full residential emoluments valued at £150 p.a. with war-time bonus of £24 14s. p.a. and an extra £50 p.a. for holders of the D.P.M., rising by £50 p.a. to £700. There are no married quarters available at present. In accordance with the policy of the British Medical Association this appointment is at present temporary but will be made with a view to filling a vacancy on the permanent staff. There is a comprehensive Mental Health Service for the City of Portsmouth based on the Hospital. The post involves work in all branches of psychiatry, including out-patients' clinics, psychoses, psychoneuroses, delinquency, and child guidance.

Applications should be addressed to Dr. Thomas Beaton, O.B.E., Physician-Superintendent, St. James Hospital, Milton, Portsmouth. FREDERICK SPARKS, Town Clerk.
Clerk to Visiting Committee, St. James Hospital.
11th January, 1946.

BOROUGH OF POOLE. Public Health Department. Applications are invited from qualified medical Women to act as TEMPORARY ASSISTANT MEDICAL OFFICER for the Maternity and Child Welfare Services of the Borough. The salary will be £600–£700 p.a., the commencing salary within the scale being according to experience. The consent of the Ministry of Health has been given to this appointment, but candidates already in whole-time public health employment under a local authority are not eligible. The successful candidate will be required to undergo a medical examination. The appointment will be terminable by 1 month's notice in writing on either side.

Forms of application may be obtained from the Medical Officer of Health, Municipal Buildings, Poole, Dorset, and should be returned not later than 8th February, 1946.
WILSON KENYON, Town Clerk.
Municipal Buildings, Poole, Dorset, January, 1946.

WOLVERHAMPTON AND MIDLAND COUNTIES EYE INFIRMARY. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (B2), with ophthalmic experience preferred, now vacant. The salary is at the rate of £200 p.a., with full residential emoluments. There are 80 Beds for in-patients and large Out-patient Department. The Infirmary is recognised as a Hospital at which a full course of instruction for admission to the D.O.M.S. may be taken. R practitioners who now hold A posts may apply, when appointment will be limited to 6 months; otherwise will be renewable.

Applications, stating age and nationality, together with copies of 3 recent testimonials, should reach the Secretary at an early date. EUSTACE LEES, Secretary.

THE ROYAL GWENT HOSPITAL, Newport, Mon. (255 Beds.) Applications are invited for the appointment of HOUSE SURGEON (A), vacant 6th February, 1946. Salary at the rate of £175 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating age, nationality, qualifications with dates, and details of previous appointments, accompanied by copies of 3 recent testimonials, should be sent immediately to: ALAN RUDDLE, Secretary-Superintendent.
12th January, 1946.

STAFFORDSHIRE COUNTY COUNCIL. Wordsley Emergency HOSPITAL, near STOURBRIDGE. (Total Beds 650.) Applications are invited for the appointment of JUNIOR RESIDENT MEDICAL OFFICER (A), Male or Female, to assist in the care of civilian beds and for orthopædic and general surgical duties in the E.M.S. Fracture A Department of the Hospital. The appointment will be for a period of 6 months and the salary at the rate of £206 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, stating age, qualifications, and the date available to commence duty, together with copies of 3 testimonials, should be sent as soon as possible to—
T. H. EVANS, Clerk of the County Council.
County Buildings, Stafford, 8th January, 1946.

ROYAL LANCASTER INFIRMARY, Lancaster. (311 Beds.) (Hospital recognised by the Royal College of Surgeons (England) for 2 Senior Posts.) Applications are invited from registered medical practitioners, Male and Female, for the following posts, vacant on dates stated:—

(1) SENIOR HOUSE SURGEON (B1), vacant 5th February. Salary £250 p.a. Suitably qualified R practitioners who now hold B2 posts, also those holding B1 and ineligible for H.M. Forces, may apply.

(2) SECOND HOUSE SURGEON (B2), obstetrics and gynæcology, vacant 1st March. Salary £210 p.a. R practitioners holding A posts may apply, when the appointment will be limited to 6 months; otherwise may be extended.

In both cases full residential emoluments are included.

Applications should be sent to—
C. H. GRIMSHAW, Superintendent-Secretary.

BRISTOL ROYAL HOSPITAL. (Incorporating Bristol Royal INFIRMARY and BRISTOL GENERAL HOSPITAL.) Applications are invited for the posts of REGISTRAR to the Ear, Nose, and Throat Department and REGISTRAR to the Dermatological Department. Both are B1 posts. Salary in each case at the rate of £500 p.a., non-resident. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, with the names and addresses of 3 referees, to be sent not later than 15th March, 1946, to—
ELLIS C. SMITH, F.C.I.S., Secretary and House Governor, Bristol Royal Infirmary.

SURREY COUNTY COUNCIL. Public Health Department— Headquarters Staff. Applications, including those from medical practitioners now serving in H.M. Forces, are invited for the appointment on the permanent staff of PRINCIPAL ASSISTANT MEDICAL OFFICER on the salary grade of £1000–£50–£1200 p.a. inclusive, plus subsistence and travelling expenses in accordance with the Council's scale. Candidates must be registered medical practitioners with a public health qualification. Practical experience in the work of a public health department is essential. The successful candidate will be required to assist in the duties pertaining to the office of County Medical Officer, under whose control he will act, and to devote the whole of his time to the work. He will rank next to the Deputy County Medical Officer on the central administrative medical staff. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to the Staffing Regulations of the Council, which provide, inter alia, that appointments may be determined at any time by 3 months' written notice. The officer appointed will be required to pass a medical examination.

Applications, stating age, qualifications, and experience together with copies of 3 recent testimonials, should be addressed to the County Medical Officer, County Hall, Kingston-on-Thames, of whom inquiries relating to the appointment may be made. Last day for receipt of applications, Monday, 20th May, 1946. Canvassing, directly or indirectly, will disqualify. DUDLEY AUCKLAND, Clerk of the Council.

County Hall, Kingston-on-Thames.

LANCASHIRE COUNTY COUNCIL. Public Health Committee. COUNTY HOSPITAL, WHISTON, PRESCOT, near LIVERPOOL. Applications are invited from suitably qualified registered medical practitioners, Male or Female, for the appointment of RESIDENT SURGICAL OFFICER (B1). Salary is at the rate of £400 p.a., together with a cost-of-living bonus and full residential emoluments. The Hospital is an acute General Hospital with a peace-time complement of 500 Beds and is a complete training school. Appointment is subject to medical examination and is superannuable. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Full particulars and forms of application may be had from the County Medical Officer of Health, Hospital and Medical Department, County Offices, Preston, to whom all applications, accompanied by copies of recent testimonials, must be forwarded not later than 31st January, 1946.

R. H. ADCOCK, Clerk of the County Council.

County Offices, Preston, 7th January, 1946.

OLDHAM ROYAL INFIRMARY. (203 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the post of HOUSE PHYSICIAN (A). The appointment is for a period of 6 months. Salary is at the rate of £175 p.a. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be sent immediately to—

F. W. BARNETT, General Superintendent and Secretary.

ALTRINCHAM GENERAL HOSPITAL, near Manchester. (100 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (A), vacant middle of February next. Salary is at the rate of £150 p.a., with usual emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be limited to 6 months; otherwise renewable for a further period.

Applications should be sent to the General Superintendent and Secretary.

CITY OF LIVERPOOL. Olive Mount Children's Hospital (for SICK, INFECTIOUS, CONVALESCENT AND OTHER CHILDREN), Old Mill-lane, LIVERPOOL, 15. Applications are invited from registered medical practitioners (Female) for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B2), including W practitioners who now hold A posts. The appointment will be for a period of 12 months. The Hospital receives a variety of sick and healthy children, and is an affiliated training school. The salary is at the rate of £350 p.a., together with cost-of-living bonus at present amounting to £24 p.a. and full residential emoluments. All fees received in connexion with the appointment to be handed over to the City Council. The appointment will be made in accordance with the Standing Orders of the City Council and will be determinable by 1 month's notice on either side.

Applications, stating whether W practitioner, age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by copies of 3 recent testimonials, should be endorsed "Resident Medical Officer" and sent forthwith to: W. H. BAINES, Town Clerk.

Municipal Buildings, Dale-street, Liverpool, 2, January, 1946.

ROYAL ALBERT EDWARD INFIRMARY AND DISPENSARY, WIGAN. Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (A), vacant 12th February, 1946. Salary £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months; otherwise may be extended for a further period.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be sent as soon as possible to—

A. STANLEY BRUNT, General Superintendent and Secretary.

EAST SUFFOLK AND IPSWICH HOSPITAL. (400 Beds.) Applica-tions are invited from registered medical practitioners, including R practitioners now holding A posts, for the post of HOUSE SURGEON (B2) to the Senior Surgeon, vacant now. Appointment will be for 6 months. Salary at the rate of £175 p.a., with full residential emoluments.

ARTHUR GRIFFITHS, Secretary.

The Hospital, Ipswich, 1st December, 1945.

PRESTON AND COUNTY OF LANCASTER QUEEN VICTORIA ROYAL INFIRMARY. The Board of Management propose to fill the following positions on the Visiting Consultant Staff:—

PHYSICIAN.
OBSTETRICIAN-GYNÆCOLOGIST.
EAR, NOSE, AND THROAT SURGEON.
ORTHOPÆDIC SURGEON.

All the above posts are remunerated. Private practice allowed. The qualifications required will be the higher appropriate degrees or diplomas in each case. Candidates appointed will be required to limit practice to their respective specialties. The posts of Obstetrician-Gynæcologist and Ear, Nose, and Throat Surgeon will include duties for major local authorities. Particulars relating to each post may be obtained from the undersigned.

Applications, together with the names of 3 referees, should be submitted to the undersigned by Saturday, 18th May, 1946. 20 copies of the application should, if possible, be sent for the use of the Appointments Committee. Personal canvass of the Committee is expressly forbidden.

JOHN GIBSON, Superintendent and Secretary.

Royal Infirmary, Preston, 9th January, 1946.

COUNTY BOROUGH OF WARRINGTON. Warrington General HOSPITAL. (340 Beds.) Applications are invited from registered medical practitioners (Male or Female) for the post of RESIDENT MEDICAL OFFICER (B2). Salary £225 p.a., together with board, residence, and laundry. There are 3 other Medical Officers in residence. The duties are principally in connexion with the maternity section, so that preference will be given to candidates who have held a resident post in a recognised Obstetrical Unit. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise 1 year.

Applications, stating age, qualifications, and experience, and date available to commence duties, together with copies of not less than 3 testimonials, to be sent forthwith to—

STUART F. ALLISON, Medical Officer of Health.

Health Department, Sankey-street, Warrington.

January, 1946.

CLAYTON HOSPITAL, Wakefield. (Voluntary Hospital—191 Beds.) Applications are invited for the appointment of PATHOLOGIST. The post is whole-time, non-resident, and carries a salary of £800 p.a., plus facilities for private practice. Private fees are to be divided as to two-thirds to the Pathologist and one-third to the Hospital, and is subject to an agreement to be entered into. The Pathologist will have charge of the whole of the Hospital's Pathology Service, which will include clinical pathology and morbid anatomy.

Applications from serving members of H.M. Forces are invited, in which case anticipated date of availability should be stated. Applications, giving full details of qualifications and experience and giving the names of 3 referees, are to be sent by 19th May, 1946, to: W. READ, Superintendent and Secretary.

BRACEBRIDGE HEATH HOSPITAL, near Lincoln. The Com-mittee of Visitors invite applications for the appointment of TEMPORARY ASSISTANT MEDICAL OFFICER (either Male or Female) from persons who are duly qualified medical practitioners. Previous mental hospital experience desirable. The salary will be based on the applicant's previous experience but will not be less than £10 10s. per week, and will be in addition to full residential emoluments valued at £125 p.a.

Applications, together with copies of recent testimonials, should be addressed to and reach the Medical Superintendent at the above address as soon as possible.

ROYAL WEST SUSSEX HOSPITAL, Chichester, invites applica-tions for the post of RESIDENT CASUALTY OFFICER AND RELIEF ANÆSTHETIST (A). The appointment covers also ear, nose, and throat, and ophthalmic work. Salary £150 p.a., with full residential emoluments. Vacant immediately for 6 months' tenure. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, with testimonials, to be addressed to the House Governor and Secretary.

COUNTY BOROUGH OF PRESTON. Medical Officer of Health. The Council invite applications for the appointment of Medical Officer of Health, Medical Officer to the Port Health Authority, and Superintendent Schools Medical Officer. Salary £1200 p.a., rising by annual increments of £50 to £1350 p.a., plus bonus. The consent of the Minister of Health has been obtained to the making of the appointment, which is subject to the provisions of section 110 of the Local Government Act, 1933, and of the Sanitary Officers (Outside London) Regulations, 1935. Candidates must be registered medical practitioners, have practical experience of the duties of the office, and possess the qualifications required by statute and the regulations of the Minister of Health.

Applications, enclosing copies of testimonials, to be delivered to me not later than the 31st March, 1946. Applications from persons at present serving in H.M. Forces will be considered. Canvassing will disqualify.

HERBERT E. NUTTER, Town Clerk.

CHELMSFORD AND ESSEX HOSPITAL. The General Com-mittee of Management invite applications for the posts of 2 HONORARY CONSULTANT PHYSICIANS and an HONORARY CONSULTANT PÆDIATRIC PHYSICIAN. To enable those serving with H.M. Forces to apply for these posts, the appointments will not be made until 4th May, 1946. Applicants should hold qualification of M.R.C.P. or M.D.

Further particulars regarding these posts can be obtained from: R. G. MORRISH, House Governor and Secretary.

IPSWICH COUNTY BOROUGH COUNCIL. Borough General HOSPITAL. Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1), vacant at an early date. Salary £500 p.a., with full residential emoluments. Duties mainly medical. Suitably qualified R practitioners holding B2 posts, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, with date when available, should be sent immediately to the Medical Officer of Health, Elm-street, Ipswich.

EAST RIDING COUNTY COUNCIL. Applications are invited from duly registered Women medical practitioners for the appointment of TEMPORARY ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER. Persons already holding a whole-time appointment under a local authority are not eligible. The duties will be mainly those concerned with maternity and child welfare and school medical inspections. Preference will be given to candidates holding a Diploma in Public Health. Salary £600 p.a., rising by annual increments of £25 to £700 p.a., with war bonus at the rate for the time being in force (now £18 2s. p.a.). The successful applicant must own and be able to drive a car, and a mileage allowance on the Council's scale will be paid.

Applications should be made on the approved form which can be obtained from the undersigned and should be forwarded, together with copies of not more than 3 recent testimonials, to the County Medical Officer of Health, County Hall, Beverley, as soon as possible. The consent of the Minister of Health has been obtained to the making of this appointment.

T. STEPHENSON, Clerk of the Council.

County Hall, Beverley, 8th January, 1946.

CITY OF LIVERPOOL. Alder Hey Children's Hospital. Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B2), vacant 1st March, 1946. The duties will be medical and surgical and the person appointed will have an opportunity of gaining experience in all branches of diseases of children. Candidates should preferably have had experience in diseases of children. The salary is at the rate of £200 p.a., with full residential emoluments. All fees received in connexion with the appointment to be handed over to the City Council. The appointment will be made in accordance with the Standing Orders of the City Council and will be determinable by 1 month's notice on either side. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise 12 months.

Applications, stating whether R practitioner, age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by copies of 3 recent testimonials, should be endorsed "Resident Medical Officer" and sent forthwith to: W. H. BAINES, Town Clerk.

Municipal Buildings, Dale-street, Liverpool, 2, January, 1946.

CITY OF LIVERPOOL. Cleaver Sanatorium for Adults, Heswall, CHESHIRE. Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B2). The salary is at the rate of £350 p.a., together with cost-of-living bonus and full residential allowances. All fees received in connexion with the appointment to be handed over to the City Council. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise 12 months.

Applications, stating whether R practitioner, age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by 3 recent testimonials, should be endorsed "Resident Medical Officer" and sent forthwith to: W. H. BAINES, Town Clerk.

Municipal Buildings, Dale-street, Liverpool, 2, January, 1946.

THE CHESTER ROYAL INFIRMARY. (Normal Capacity 225 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), to take up duty on 1st February, 1946. Salary is at the rate of £175 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be sent to the Secretary.

CITY OF LEICESTER. City General Hospital. Applications are invited from registered medical practitioners for the appointment of RESIDENT HOUSE SURGEON (A). Duties: general surgical and orthopædic. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months; otherwise will not exceed 1 year.

Applications (on forms supplied) must be submitted as soon as possible, endorsed "House Surgeon, City General Hospital," and addressed to: E. K. MACDONALD, Medical Officer of Health.

City Health Department, Grey Friars, Leicester.

NORTHAMPTON COUNTY MENTAL HOSPITAL, Berrywood, NORTHAMPTON. ASSISTANT MEDICAL OFFICER (B1). Applications are invited for the above permanent pensionable post from suitably qualified practitioners, including those serving in H.M. Forces, holders of B2 appointments, and holders of B1 appointments if ineligible for H.M. Forces. The commencing salary for the post is £400 p.a., rising by £25 p.a. to £500 p.a., plus an extra £50 for the D.P.M., plus full residential emoluments valued for superannuation purposes at £150 p.a. In the case of candidates with special qualifications or psychiatric experience, the salary may commence at any point within the scale.

Applications, accompanied by the names and addresses of 2 referees, should be addressed to the Medical Superintendent. The appointment will not be made until 16th May, 1946.

MONMOUTHSHIRE COUNTY COUNCIL. The County Hospital, PANTEG, GRIFFITHSTOWN. Applications are invited from registered medical practitioners, Female, for the appointment of ASSISTANT RESIDENT MEDICAL OFFICER (B2) at the County Hospital, Panteg. Salary is at the rate of £200 p.a., with full residential emoluments. The appointment is for 1 year.

Applications to be forwarded to the Medical Superintendent at the Hospital as soon as possible. D. ROCYN JONES,

County Hall, Newport, Mon. County Medical Officer.

ESSEX COUNTY COUNCIL HOSPITAL, Broomfield. Applications are invited from registered medical practitioners for the appointment of TEMPORARY FIRST ASSISTANT MEDICAL OFFICER (B1) at the Essex County Council Hospital, Broomfield, which contains 320 Beds for the treatment of male patients suffering from pulmonary or surgical tuberculosis. Applicants should have held house appointments and have had experience in the treatment of tuberculosis. The salary attaching to the post is at the rate of £440 a year, rising, subject to satisfactory service, by annual increments of £25 to £540 a year, together with the usual indoor emoluments valued at £160 a year. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply. The provisions of the Local Government Act, 1937, will be applicable to the person appointed to the post.

Forms of application may be obtained from the undersigned, to whom they should be returned completed, accompanied by copies of 3 recent testimonials, with as little delay as possible. Canvassing, either directly or indirectly, is forbidden.

JOHN E. LIGHTBURN, Clerk of the County Council.

County Hall, Chelmsford, 7th January, 1946.

SURREY COUNTY COUNCIL. St. Helier County Hospital, CARSHALTON. (862 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B1) to the Obstetric and Gynæcological Department of the St. Helier Hospital (98 obstetric beds and 30 gynæcological beds). The appointment will be on the Council's temporary staff and subject to 1 month's notice on either side, but any Local Government Superannuation rights will be preserved. Salary at the rate of £350 p.a., plus full residential emoluments plus bonus. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Apply to the Medical Superintendent by the 31st January, 1946.

SURREY COUNTY COUNCIL. St. Helier County Hospital, CARSHALTON. (862 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT JUNIOR PÆDIATRICIAN (B2). The salary is at the rate of £250 p.a., with full residential emoluments and bonus. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise not exceeding 12 months.

Apply to the Medical Superintendent by 31st January, 1946.

HERTFORDSHIRE COUNTY COUNCIL. Haymeads Hospital, BISHOP'S STORTFORD. Applications are invited from registered medical practitioners (Male) for the appointment of HOUSE PHYSICIAN (A) at the above Hospital, vacant 14th February, 1946. The salary is at the rate of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise not exceeding 1 year.

Applications, together with copies of references, should be sent to the Medical Superintendent, Haymeads Hospital, Bishop's Stortford, Herts, not later than Monday, 4th February.

P. ELTON LONGMORE, Clerk of the County Council.

County Hall, Hertford.

FREE EYE HOSPITAL, Southampton. Applications are invited from registered medical practitioners, Male and Female, if possible with ophthalmic experience, for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £200 p.a. or more according to experience, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise may be renewed by the Committee of Management.

Applications to the Secretary.

CITY OF BIRMINGHAM. Applications are invited from laboratory technicians (Men or Women) with experience in general bacteriological and serological technique for positions in the City Bacteriological Laboratory. 3 vacancies are to be filled, and 1 of the successful candidates will be allocated for duty at the Yardley Green Road Sanatorium. Salary within Grade C or B of the National Scales recently adopted by the Joint Committee (Hospital Staffs) according to experience and qualifications. The appointments are subject to medical examination and to the provision of the Local Government Superannuation Act, 1937.

Applications should be sent to the Acting Director, City Bacteriological Laboratory, 150, Great Charles-street, Birmingham, 3.

EAST SUFFOLK AND IPSWICH HOSPITAL, Ipswich. (400 Beds.) Applications are invited from registered medical practitioners, including R practitioners who now hold A posts, for the appointment of HOUSE SURGEON (B2) to the E.N.T. and Eye Departments, vacant now. Appointment will be for 6 months. Salary is at the rate of £175 p.a., with full residential emoluments. The Hospital is recognised for the postgraduate study for the diplomas of D.L.O. and D.O.M.S.

ARTHUR GRIFFITHS, Secretary.

The Hospital, Ipswich, 19th January, 1946.

ROYAL SHEFFIELD INFIRMARY AND HOSPITAL. The Royal INFIRMARY, SHEFFIELD. Applications are invited from registered medical practitioners, Male and Female, for the post of RESIDENT HOUSE OFFICER (A) who may be asked to carry out the duties of House Physician and/or House Surgeon, now vacant. Salary is at the rate of £80 p.a., with full residential emoluments, and a bonus of £20 payable at the expiration of 6 months' satisfactory service. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications should be sent forthwith to: P. N. GLASS, General Superintendent, the Royal Infirmary, Sheffield, 6.

8th January, 1946.

HULL ROYAL INFIRMARY. Applications are invited for the post of TEMPORARY HONORARY ASSISTANT OPHTHALMIC SURGEON from candidates holding the Diploma in Ophthalmic Medicine and Surgery. (The permanent post will be advertised later in the year.)

Applications, with copies of testimonials, should be addressed to the Chairman of the Managing Committee.

R. J. CARLESS, House Governor.

ROCHDALE INFIRMARY, Lancs. (110 Beds.) The Board of Management invites applications from registered medical practitioners, Male and Female, for the appointment, vacant shortly, of HOUSE PHYSICIAN (A). Duties include work in the Ophthalmic, Aural, and Gynæcological Departments, as well as Medical Clinic, and afford excellent opportunity for experience. Salary £200 p.a., with full residential emoluments. The successful candidate must be a member of a Medical Defence Society. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications to: W. WYNNE, Superintendent-Secretary.

ROCHDALE INFIRMARY, Lancs. (110 Beds.) The Board of Management invite applications from registered medical practitioners, Male and Female, for the appointment, shortly vacant, of HOUSE SURGEON (A). Salary £200 p.a., with full residential emoluments. The successful candidate must be a member of a Medical Defence Society. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications to: W. WYNNE, Superintendent and Secretary.

LEEDS PUBLIC DISPENSARY AND HOSPITAL. Applications are invited from registered medical practitioners for the appointments of HOUSE SURGEON (A), mainly casualty duties, and HOUSE PHYSICIAN (A). Appointments for 6 months. Salary at the rate of £150 p.a., with board, residence, and laundry. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply.

Applications, stating age, qualifications, and nationality, and accompanied by copies of 3 recent testimonials, to be addressed to: CHARLES F. J. MAURY, Secretary and Superintendent.

WESTON-SUPER-MARE GENERAL HOSPITAL. (100 Beds.) Applications are invited from medical practitioners for the appointment of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A), duties to commence 1st February, 1946. Salary for each post at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply, when appointment will be for 6 months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be addressed to: LESLIE J. FURSLAND, Secretary.

VICTORIA HOSPITAL, Accrington. Applications are invited from registered medical practitioners (Male or Female) for the post of HOUSE SURGEON (B2). Appointment will be for a period of 6 months. Salary at the rate of £200 p.a., with full residential emoluments. R practitioners who now hold A posts may apply.

Applications, with copies of recent testimonials, to be sent to: P. D. WADSWORTH, Honorary Secretary.

THE PRINCE OF WALES'S HOSPITAL, Plymouth. Applications are invited for the appointment of a Whole-time RADIOTHERAPIST. Salary up to £1000 p.a. The successful candidate will be required to work in association with the Director of the Radiological Department of the Bristol Royal Hospital.

Applications, including those from Service candidates, stating age, qualifications, and experience, together with copies of 3 recent testimonials, should be sent not later than 22nd April, 1946, to: ARTHUR R. CASH, General Superintendent.

ROYAL PORTSMOUTH HOSPITAL. Applications are invited from registered medical practitioners (Male), including practitioners within 3 months of qualification and liable under the National Service Acts, for the appointment of CASUALTY OFFICER (A). 6 months' appointment. Salary £150 p.a., with full residential emoluments.

Applications, stating age, qualifications, and nationality, and accompanied by copies of testimonials, to be sent to—

G. A. HUGHES, Secretary.

LEIGH INFIRMARY, Lancs. (General Hospital—102 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 23rd January, 1946. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise 12 months.

Applications, stating age and accompanied by copies of 3 testimonials, to be addressed to—

(Miss) F. M. EVISON, Acting Secretary.

THE RADCLIFFE INFIRMARY, Oxford. Applications are invited for the post of HONORARY PHYSICIAN to the above Hospital. The Honorary Assistant Physician will be a candidate for the post.

Applications, together with the names of 3 referees, must be received by the undersigned not later than the 19th May, 1946.

A. G. E. SANCTUARY, Administrator.

HALIFAX GENERAL HOSPITAL. (450 Beds.) Resident Medical Officers (B2) required as soon as possible.

(1) JUNIOR OBSTETRIC OFFICER for a department of 80 Beds. Previous experience in obstetrics a recommendation.

(2) HOUSE SURGEON to E.N.T. and Orthopædic Departments.

Salary £200 to £350 p.a., according to experience, plus £150 p.a. in the event of the appointment being non-resident. R practitioners holding A posts may apply, when appointments will be limited to 6 months.

Applications to be made to the Medical Superintendent.

CITY OF LEICESTER, COUNTY OF LEICESTERSHIRE, COUNTY BOROUGH OF DERBY. The Health Committees of the City and County of Leicester and of the County Borough of Derby, together with the Boards of Governors of the Royal Infirmaries of Leicester and Derby, invite applications from gentlemen having experience in thoracic surgery and possessing the F.R.C.S. (or its equivalent) for the post of Part-time THORACIC SURGEON, at a total salary of £1500 a year. Private practice will be allowed, but it is estimated that the total time required to be shared between the Joint Authorities will amount to approximately 5 days a week.

Details of the appointment may be obtained from the undersigned, to whom applications should be submitted by the 25th May, 1946. The permission of the Ministry of Health has been obtained for the appointment, and applications are invited from persons serving in H.M. Forces.

E. K. MACDONALD,
Medical Officer of Health, City of Leicester.
City Health Department, Grey Friars, Leicester.
January, 1946.

THE ROYAL LIVERPOOL CHILDREN'S HOSPITAL, Myrtle-street, LIVERPOOL, 7. The Committee invite applications for the appointment of an AN.ESTHETIST. Payment at the rate of 2½ guineas per session up to 2½ hours' duration. Candidates serving with H.M. Forces are also invited to apply.

Applications should be forwarded to the Secretary of the Hospital by Saturday, 18th May, 1946.

ROYAL SURREY COUNTY HOSPITAL, Guildford. (247 Beds.) Applications are invited from registered medical practitioners, including those within 3 months of qualification and liable under the National Service Acts, for 2 HOUSE SURGEONS (A), vacant 8th and 28th February. The posts, which are recognised in connexion with the F.R.C.S. examination, are tenable for 6 months. Salary at the rate of £175 p.a., with full residential emoluments.

Applications, stating age, qualifications, experience, and nationality, with copies of not more than 3 testimonials, should reach the Secretary-Superintendent not later than the 29th January.

THE ROYAL HOSPITAL, Wolverhampton. (Incorporated under Royal Charter.) The Board of Management invites applications from qualified medical practitioners (Male or Female) for the post of HONORARY ASSISTANT AN.ESTHETIST at The Royal Hospital, Wolverhampton. The successful candidate must confine himself or herself to the practice of anæsthesia. The amount of honorarium to be paid to the holder of this post will be a subject for arrangement between the successful applicant and the Board of Management. The Royal Hospital, Wolverhampton, is an associated Hospital of the University of Birmingham.

Applications must be received on or before 20th May, 1946, and should be sent to: Mr. W. COCKBURN, House Governor, from whom further particulars can be obtained.

8th December, 1945.

THE ROYAL HOSPITAL, Wolverhampton. (Incorporated under Royal Charter.) Following the notice announcing that a vacancy would shortly occur on the Honorary Staff for a PÆDIATRICIAN, the Board of Management now invites applications from Service or other candidates for this post. Applicants must be Fellows or Members of the Royal College of Physicians of London or Edinburgh, have experience in pædiatrics, and confine themselves to consulting practice. The amount of honorarium to be paid to the holder of this post will be a subject for arrangement between the successful candidate and the Board of Management. The Royal Hospital, Wolverhampton, is an associated Hospital of the University of Birmingham.

Applications must be received on or before Monday, 20th May, 1946, and should be sent to: Mr. W. COCKBURN, House Governor, from whom further particulars can be obtained.

8th December, 1945.

THE ROYAL HOSPITAL, Wolverhampton. (Incorporated under Royal Charter.) Following the notice previously announced that a vacancy would shortly occur on the Honorary Staff for a DERMATOLOGIST, the Board of Management now invites applications for this post. Applicants must have special experience in dermatology. Applicants must confine themselves to consulting practice. The amount of the honorarium to be paid to the holder of this post will be a subject for arrangement between the successful applicant and the Board of Management. The Royal Hospital, Wolverhampton, is an associated Hospital of the University of Birmingham.

Applications must be received on or before Monday, 20th May, 1946, and should be sent to: Mr. W. COCKBURN, House Governor, from whom further particulars can be obtained.

8th December, 1945.

THE ROYAL HOSPITAL, Wolverhampton. (Incorporated under Royal Charter.) The Board of Management invites applications for the post of HONORARY ASSISTANT RADIOLOGIST at The Royal Hospital, Wolverhampton. Applicants must have special knowledge of radiology (diagnostic) and confine themselves to consulting practice. The amount of honorarium to be paid to the holder of this post will be a subject for arrangement between the successful applicant and the Board of Management. The Royal Hospital, Wolverhampton, is an associated Hospital of the University of Birmingham.

Applications must be received on or before 20th May, 1946, and should be sent to: Mr. W. COCKBURN, House Governor, from whom further particulars can be obtained.

THE ROYAL HOSPITAL, Wolverhampton. (Incorporated under Royal Charter.) Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (A), vacant now. Salary is at the rate of £100 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

8th January, 1946. W. COCKBURN, House Governor.

ROYAL SUSSEX COUNTY HOSPITAL, Brighton. The Board of Management invites applications for the following appointments from candidates who possess the usual necessary medical and surgical qualifications and are duly registered under the Medical Acts:—

(*a*) 2 HONORARY ANÆSTHETISTS. The successful candidates will be required to attend for at least 2 sessions per week.

(*b*) ASSISTANT HONORARY DERMATOLOGIST.

(*c*) 3 HONORARY CLINICAL ASSISTANT ANÆSTHETISTS, for a term of 1 year, the holders, however, to be eligible to apply for the posts of Honorary Anæsthetists (*a*).

Further particulars may be obtained from, and applications must reach, the Secretary-Superintendent, in the case of (*a*) and (*b*) by 1st June, 1946, and in the case of Clinical Assistant Anæsthetists (*c*) by the 11th February, 1946.

DORSET COUNTY HOSPITAL, Dorchester, Dorset. (Voluntary Hospital—100 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (A), vacant 26th February next. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for 6 months. C. H. SPENCE, Secretary.

WALSALL GENERAL HOSPITAL. (181 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of CASUALTY OFFICER AND ORTHOPÆDIC HOUSE SURGEON (B2). Salary is at the rate of £200 a year, with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be forwarded immediately to—

W. H. HARPER, Honorary House Governor.

WALSALL GENERAL HOSPITAL. (181 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the 2 vacant posts of HOUSE SURGEON (A), each at a salary of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be forwarded immediately to—

W. H. HARPER, Honorary House Governor.

ROYAL SALOP INFIRMARY, Shrewsbury. (203 Beds.) Applications are invited from registered medical practitioners for the following posts:—

RESIDENT SURGICAL OFFICER (B1). Salary £350 p.a. to a selected candidate holding an F.R.C.S. diploma; otherwise £250 p.a., with the usual residential emoluments. The appointment will be, in the first instance, for a period of 12 months.

HOUSE SURGEON (B1). Salary £200 p.a., with the usual residential emoluments. The appointment will be, in the first instance, for a period of 6 months.

R practitioners holding B2 posts, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age, qualifications, nationality, and experience, accompanied by copy testimonials, should be sent to the Secretary-Superintendent, Royal Salop Infirmary, Shrewsbury.

Board Room, 5th January, 1946.

SCARBOROUGH HOSPITAL, Yorkshire. (Normally 140 Beds.) Applications are invited from Female registered medical practitioners for the posts of HOUSE SURGEON (A) and HOUSE PHYSICIAN (A). The appointments are for 6 months, commencing 1st February and 1st March, 1946, respectively, and the salary is at the rate of £175 p.a., with board, residence, laundry, &c.

Applications, with age, testimonials, qualifications, &c., to be sent immediately to the Secretary.

CITY OF CARLISLE. City General and Fusehill Emergency HOSPITALS, CARLISLE. (100 Civilian Beds and 180 E.M.S.) Applications are invited for the appointment of JUNIOR RESIDENT MEDICAL OFFICER (A) to assist in care of civilian beds and for orthopædic and general surgical duties in the adjacent E.M.S. Fracture "A" Hospital. Appointment will be for a period of 6 months from 1st February, 1946. Salary £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications should be sent to the Acting Medical Officer of Health, 22, Fisher-street, Carlisle, as early as possible.

5th January, 1946.

WEST RIDING EDUCATION DEPARTMENT. Applications are invited from suitably qualified Women for appointment as SUPERVISORS OF SCHOOL MEALS. The duties will be connected with the provision and service of school meals, and the persons appointed will be required to advise on questions of diet, staffing, equipment, and general organisation. Candidates should have a knowledge of dietetics. Experience of teaching, organising, or large-scale catering would be additional recommendations. Salary £300–£15–£450, plus a cost-of-living bonus in accordance with the County Council's scale, at present at the rate of £48 2s. p.a. The posts are superannuable.

Application forms, with further particulars of the appointments, to be obtained from the Chief Education Officer, County Hall, Wakefield. Last date for applications 2nd February, 1946.

WORCESTER ROYAL INFIRMARY. Applications are invited for the position of HOUSE SURGEON (A). The salary will be at the rate of £120 a year, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, with copies of not more than 3 testimonials, should be addressed to the Acting Superintendent-Secretary.

DERBYSHIRE ROYAL INFIRMARY, Derby. Applications are invited from registered medical practitioners for the post of RESIDENT SURGICAL OFFICER (B1) for accident and orthopædic work, vacant 18th February. Candidates should have held house appointments and had experience in fractures and orthopædics. Salary at rate of £350 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating nationality, age, and experience, together with copies of recent testimonials, to—

ARTHUR TAYLOR, Superintendent and Secretary.

PETERBOROUGH AND DISTRICT MEMORIAL HOSPITAL. (154 Normal Beds plus 40 E.M.S. Beds.) Applications are invited from registered medical practitioners (Male or Female) for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications to the Secretary.

HARLOW WOOD ORTHOPÆDIC HOSPITAL, near Mansfield, NOTTS. (355 Beds—E.M.S. and Civilian.) (Rehabilitation Unit, Regional Orthopædic Centre, and Peripheral Nerve Injury Unit.) Applications are invited from registered medical practitioners, including R practitioners who now hold A posts, for the appointment of RESIDENT HOUSE SURGEON (B2). Appointment will be for a period of 6 months at the rate of £200 p.a., with full resident emoluments.

D. ROBERTS, Secretary-Superintendent.

WEYMOUTH AND DISTRICT HOSPITAL, Melcombe-avenue, WEYMOUTH. Applications are invited from registered medical practitioners for appointment of HOUSE SURGEON (B2). The appointment is open to Male and Female candidates and will be for 6 months at a salary of £200 p.a., with full residential emoluments. R practitioners holding A posts may also apply.

Applications to be forwarded as early as possible to the Secretary and Superintendent.

BECKENHAM AND PENGE MATERNITY HOSPITAL. (34 Beds.) Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B2), now vacant. Salary at the rate of £200 p.a., with full residential emoluments valued at £120. The provisions of the Local Government Superannuation Act, 1937, will apply. R practitioners holding A posts may apply, when appointment will be limited to 6 months.

Applications should be sent not later than 26th January, 1946, to: C. ERIC STADDON, Clerk of the Joint Committee.

Town Hall, Beckenham, Kent. 31st December, 1945.

BRISTOL ROYAL HOSPITAL. (Incorporating the Bristol Royal INFIRMARY and BRISTOL GENERAL HOSPITAL.) Applications are invited from registered medical practitioners for 16 Resident (A) appointments for the 6 months commencing 1st March, 1946. Salary in each case at the rate of £80 p.a. War bonus at the rate of £20 p.a. will also be paid, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications are also invited for the post of CASUALTY HOUSE SURGEON (B1). Salary at the rate of £140 p.a. plus war bonus at the rate of £20 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, which must be made on forms to be obtained from the undersigned, must be returned on or before 28th January, 1946. ELLIS C. SMITH, Secretary and House Governor.

Bristol Royal Infirmary.

SALISBURY GENERAL INFIRMARY. (Voluntary Hospital—225 Beds.) Applications are invited from registered medical practitioners, including R practitioners who now hold A posts, for the appointment of RESIDENT ANÆSTHETIST (B2), vacant 1st February, 1946. The appointment will be for 6 months. The salary is at the rate of £200 p.a., with full residential emoluments.

Applications, stating age, qualifications, and experience, and accompanied by copies of 3 recent testimonials, should be sent not later than the 23rd January to the Superintendent.

ST. BARTHOLOMEW'S HOSPITAL, Rochester. (201 Beds.) HOUSE PHYSICIAN (B2). Applications are invited for above post, vacant 1st March, 1946, from registered medical practitioners. Salary £150 p.a., with full residential emoluments (plus E.M.S. grant at present approximately £50 p.a.). R practitioners who now hold A posts may apply, when the appointment will be for 6 months.

Applications, stating age, nationality, and qualifications, to be forwarded to the Superintendent-Secretary as soon as possible.

5th January, 1946.

WHITCHURCH EMERGENCY HOSPITAL, Cardiff. (800 Beds.) Applications are invited from registered medical practitioners (Male and Female) for the following appointments, now vacant:—

HOUSE SURGEON (A). Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

HOUSE SURGEON (B2). R practitioners who now hold A posts may apply.

The appointments are both for 6 months, and the salary is at the rate of £200 p.a., with full residential emoluments.

Applications, stating age, qualifications, and nationality, should be sent to the Medical Superintendent.

CHORLEY AND DISTRICT HOSPITAL, Lancs. (100 Beds.) Applications are invited from registered medical practitioners (Male or Female) for the post of HOUSE SURGEON (B2). Appointment will be for a period of 6 months. Salary at the rate of £250 p.a., with full residential emoluments. R practitioners holding A posts may apply.

Applications, with copies of recent testimonials, to be sent to the Secretary-Superintendent.

THE UNIVERSITY OF SHEFFIELD. Applications are invited for the newly established Full-time CHAIR OF CHILD HEALTH in the University. The Professor will work in close coöperation with the Professors of Medicine, Surgery, and Midwifery in organising the teaching in his Department and will be expected to prosecute and foster research in the problems of Child Health. He will arrange all lectures, classes, and demonstrations for undergraduate and postgraduate students in the Department of Child Health. During his tenure of the Chair, the Professor will be given the status of Honorary Physician to the Children's Hospital and will be provided with in-patient, out-patient, and laboratory facilities. He will also have access to the children's wards of the City General (Municipal) Hospital. Salary £2000 a year, with superannuation provision under the Federated Superannuation Scheme for Universities. Under this scheme the Professor will contribute 5% of his salary and a further 10% of the salary will be *added* by the University, the whole 15% being applied in accordance with the terms of the scheme. The Professor shall not undertake private practice or consulting work except in cases referred to him by members of the honorary staff of the teaching hospitals. Such fees as he may accept in these cases shall be paid over by him to the University. A candidate must be a graduate in medicine and either a Fellow or a Member of the Royal College of Physicians of London. He must have held a responsible clinical appointment in a teaching hospital and must produce evidence of his capacity to carry out and to direct clinical research. It is desired that the successful candidate begin his duties on 1st October, 1946, or as soon as possible thereafter.

Applications (6 copies), with testimonials and the names of referees, should be sent to the undersigned, from whom further particulars may be obtained. In order to allow time for candidates now abroad or in H.M. Forces to apply, the last date for receipt of applications has been fixed at 13th May, 1946. A referee who is abroad may send a confidential report direct to the Registrar without waiting for an inquiry from the University. A. W. CHAPMAN, Registrar.

STAMFORD, RUTLAND AND GENERAL INFIRMARY. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), now vacant. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, nationality, and accompanied by copies of 3 recent testimonials, should be sent immediately to the Secretary, H. F. DONALD, The Infirmary, Stamford.

COVENTRY AND WARWICKSHIRE HOSPITAL. Applications are invited from registered medical practitioners, Male and Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for the appointment of HOUSE SURGEON (A) for General Surgical duties. The appointment, which is for 6 months, is vacant on 27th February, 1946. Salary at the rate of £170 p.a., with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be addressed immediately to—

S. CECIL HILL, House Governor and Secretary.

COVENTRY AND WARWICKSHIRE HOSPITAL. Applications are invited from registered medical practitioners, Male and Female, including R practitioners who now hold A posts, for the appointment of HOUSE SURGEON (B2) to the Fracture and Orthopædic Department. The appointment, which is for 6 months, is vacant from December. Salary at the rate of £170 p.a., together with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be sent to: S. CECIL HILL, House Governor and Secretary.

COVENTRY AND WARWICKSHIRE HOSPITAL. Applications are invited from registered medical practitioners, Male or Female, including R practitioners who now hold A posts, for the appointment of HOUSE SURGEON (B2) for general surgical duties. The appointment, vacant 1st January, 1946, is for 6 months. Salary at the rate of £170 p.a., together with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and accompanied by copies of 3 recent testimonials, should be sent immediately to—

S. CECIL HILL, House Governor and Secretary.

LINCOLN COUNTY HOSPITAL. (Voluntary Hospital—200 Beds.) Applications are invited from registered practitioners for the appointment of SENIOR HOUSE SURGEON (B1), vacant 7th February, 1946. Applicants should have held house appointments and had surgical experience. Salary is at the rate of £325 p.a. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age, nationality, qualifications with dates, experience and details of previous appointments, and accompanied by copies of 3 recent testimonials, should be sent to: ARTHUR MOORE, Secretary-Superintendent.

Lincoln, 29th December, 1945.

ROYAL WEST SUSSEX HOSPITAL, Chichester. (274 Beds, including 160 E.M.S.) Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B2), vacant 29th January, 1946. The appointment is for 6 months. Salary £225 p.a., with full residential emoluments. R practitioners now holding A posts may apply.

Applications, accompanied by 3 testimonials, should be addressed to: K. H. WILLIAMS, House Governor and Secretary.

1st January, 1946.

COUNTY BOROUGH OF BLACKBURN. Public Assistance DEPARTMENT. Applications are invited from registered medical practitioners for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B1) at Queen's Park Hospital and Institution, Blackburn. Salary £350 p.a. (plus a cost-of-living bonus), increasing by annual increments of £25 to £450, together with board, apartments, and attendance. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and ineligible for H.M. Forces, may apply.

Further particulars may be obtained from the Public Assistance Officer, Cardwell-place, Blackburn, to whom applications, stating age, qualifications, and experience, accompanied by copies of 2 recent testimonials, must be sent.

CHAS. S. ROBINSON, Town Clerk.

COUNTY BOROUGH OF GREAT YARMOUTH. Applications are invited from qualified medical practitioners, including those serving in H.M. Forces, holding a degree in or Diploma in Public Health, for the appointment of MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER, at a salary of £950 p.a., rising by annual increments of £50 to a maximum of £1150 p.a., inclusive of all fees and emoluments, plus a car allowance at the Council's scale, and cost-of-living bonus. Applicants must be fully qualified to carry out all the duties of Medical Officer of Health, School Medical Officer, Chief Tuberculosis Officer, Superintendent of the Borough Isolation Hospital, Port Medical Officer, and such other duties as may from time to time be prescribed by the Council. The appointment will be subject to the approval of the Ministries of Health and Education, and will also be subject to Section 110 of the Local Government Act, 1933, and to the Sanitary Officers' (Outside London) Regulations, 1935. The appointment is also subject to the provisions of the Local Government Superannuation Act, 1937, and to a medical examination. The person appointed will be required to give 3 months' notice to terminate the appointment and during his tenure of the office to live within the Borough, and to pay over to the Council all moneys received by him in connexion with the appointment from whatever source such moneys are received. He must devote his whole time to the duties of the office and not engage in private practice nor accept any other appointment except with the consent of the Council. Applicants who at present hold temporary or permanent whole-time appointments as Medical Officers (including Medical Officers in the School Medical Service) are reminded of the necessity for obtaining from their Principal Regional Medical Officer the consent of the Ministry of Health to their application for the appointment.

Applications for the appointment endorsed "Medical Officer of Health," stating age, qualifications, and details of previous experience, and accompanied by copies of not more than 3 recent testimonials, must reach me not later than NOON on the 30th April, 1946. Applicants serving overseas may furnish the names of 3 referees in lieu of forwarding copies of testimonials and should indicate where a telegram or cable will reach them if selected for interview. Canvassing, either directly or indirectly, will disqualify, and applicants must disclose in writing whether to their knowledge they are related to any member of or holder of any senior office under the Council. A candidate who fails to do so will be disqualified, and if appointed will be liable to dismissal without notice. The consent of the Minister of Health has been obtained to the making of this appointment.

FARRA CONWAY, Town Clerk.

Town Hall, Great Yarmouth, 14th December, 1945.

COUNTY BOROUGH OF GREAT YARMOUTH. Applications are invited from qualified medical practitioners for appointment as TEMPORARY ASSISTANT MEDICAL OFFICER OF HEALTH in the Public Health Department at a salary of £500 p.a., rising by annual increments of £50 to £600 p.a., plus cost-of-living bonus, but inclusive of all fees and emoluments. The duties of the post will be mainly those in connexion with the School Health Service, and the appointment will be subject to 1 month's notice on either side. Candidates already in whole-time employment as Public Health Medical Officers will not be eligible for the appointment. The person appointed will be required to devote his whole time to the duties of the office and not engage in private practice, nor accept any other appointment except with the consent of the Council, and to pass a medical examination.

Applications for the appointment, endorsed "Assistant Medical Officer of Health," stating age, qualifications, and details of previous experience, and accompanied by copies of not more than 3 recent testimonials, must reach me not later than 1st February, 1946. Canvassing, either directly or indirectly, will disqualify, and applicants must disclose in writing whether to their knowledge they are related to any member of or holder of any senior office under the Council. A candidate who fails to do so will be disqualified and, if appointed, liable to dismissal without notice. The consent of the Minister of Health has been obtained to the making of this appointment.

FARRA CONWAY, Town Clerk.

Town Hall, Great Yarmouth, 2nd January, 1946.

BLACKBURN ROYAL INFIRMARY. (248 Beds.) Applications are invited from registered medical practitioners (Male or Female) for the following posts:—

HOUSE PHYSICIAN (A), vacant 1st February.
HOUSE SURGEON (A), vacant 1st February.
HOUSE SURGEON (B2) (Fracture Department and General Surgery), vacant 1st March.

Salary £175, with full residential emoluments. Applicants for the A posts may include practitioners within 3 months of qualification and liable under the National Service Acts and for the B2 post, R practitioners now holding A posts may apply, when appointments will be for 6 months.

Applications, stating age, nationality, qualifications, and details of experience, should be sent as soon as possible to—

T. DEWHURST, General Superintendent and Secretary.

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HUDDERSFIELD ROYAL INFIRMARY. (321 Beds.) **House Surgeon** (A), required to commence 6th February, 1946. Salary at the rate of £150, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, together with copies of 3 recent testimonials, to be addressed as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

CARDIGANSHIRE GENERAL HOSPITAL, Aberystwyth. Applications are invited from medical practitioners, Male or Female, including R practitioners holding A posts, for the post of JUNIOR HOUSE SURGEON (B2). The appointment will be for 6 months. Salary £175 p.a., with residential emoluments.

Applications, with copies of recent testimonials, to be sent to the Secretary.

ROYAL SHEFFIELD INFIRMARY AND HOSPITAL. Casualty DEPARTMENT. Applications are invited from registered medical practitioners, Male or Female, including Medical Officers recently demobilised from H.M. Forces, for the 2 posts of SECOND ASSISTANT (B1) to the Orthopædic Department at each Unit Hospital, with duties in the Casualty Department, now vacant. Salary £350 p.a., resident. Applicants should have held house appointments and had experience. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and have been rejected by the Services, are invited to apply.

Applications to be forwarded immediately to—

P. N. GLASS, General Superintendent.

Royal Infirmary, Sheffield, 6.
14th January, 1946.

WEST RIDING OF YORKSHIRE HOSPITALS BOARD, High-ROYDS EMERGENCY HOSPITAL, MENSTON, near LEEDS. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE OFFICER (A), now vacant. The salary, together with full residential emoluments, will be at the rate of £120 p.a. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise not exceeding 1 year.

Applications, with full particulars, to be submitted to the Medical Superintendent, Highroyds Emergency Hospital, Menston, near Leeds, forthwith.

G. L. BANNER, Clerk of the Board.

Board Offices, Victoria Chambers, Wood-street, Wakefield, January, 1946.

NEWARK TOWN AND DISTRICT HOSPITAL. (70 Normal Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), now vacant. The salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications to be sent to the Secretary-Superintendent as soon as possible.

ROYAL MANCHESTER CHILDREN'S HOSPITAL, Pendlebury. Applications are invited from registered medical practitioners, Male and Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for the following appointments:—

HOUSE SURGEON (A), vacant 1st March, 1946.

ASSISTANT MEDICAL OFFICER (A) at the Out-patients' Department, Gartside-street, Manchester, vacant 16th March. The hours of duty at the Out-patients' Department are from 9 A.M. until 1 P.M. or until the work of the Department is finished. The successful candidate can, if desired, take up residence at the Hospital, Pendlebury.

Each appointment is for a period of 6 months and the salary is at the rate of £150 p.a., with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, to be sent to the undersigned as soon as possible.

By Order, H. HEARDMAN,
General Superintendent and Secretary.

ROYAL MANCHESTER CHILDREN'S HOSPITAL, Pendlebury. Applications are invited for the following posts:—

RESIDENT MEDICAL OFFICER (B1), commencing 15th March, 1946.

RESIDENT SURGICAL OFFICER (B1), commencing 1st May, 1946.

Salary is at the rate of £175 p.a., and each appointment is for a period of 6 months. Suitably qualified R practitioners holding B2 posts, also those holding B1 and ineligible for H.M. Forces, may apply.

Applications, stating age and accompanied by copies of not more than 3 recent testimonials, to be sent to the undersigned as soon as possible. By order, H. HEARDMAN,
General Superintendent and Secretary.

AUCKLAND HOSPITAL BOARD, New Zealand. Applications, addressed to the undersigned and closing on the 28th day of February, 1946, are invited from registered medical practitioners of the British Empire of at least 10 years' standing and having wide clinical and administrative experience for appointment as SUPERINTENDENT-IN-CHIEF of the Board's Institutions at a salary of £2000, rising by annual increments of £50 to a maximum of £2250, living-out. (New Zealand currency.) The Board's Institutions include 4 major hospitals accommodating 2600 patients with other hospitals in course of planning. The position will be wholly administrative.

Conditions of appointment, accompanying explanatory memorandum and official form of application, may be obtained from the office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2.

Applications should be endorsed on envelope "Superintendent-in-Chief" and sent to New Zealand direct by Air Mail.

R. F. GALBRAITH, Secretary.

THE SOUTH CANTERBURY HOSPITAL BOARD, Timaru, NEW ZEALAND. Applications by air mail, closing with the undersigned on 1st April, 1946, are invited for the position of Part-time RADIOLOGIST to the Timaru Public Hospital, with right of private practice. Competent full-time Radiographer employed. Salary at rate of £500 N.Z. p.a., with 4 weeks' annual leave on pay. Successful applicant will have option of taking over a private hospital radiology practice without goodwill payment, but would be required to purchase at valuation (approximately £800), on easy terms, the existing plant housed in suite of rooms which Hospital will lease for £208 p.a.

Further particulars may be obtained from Lt.-Col. D. G. WALLACE, N.Z.M.C. Liaison Officer, C/-N.Z. House, Strand, London. Applicants to state age, married or single, qualifications, previous experience, and to enclose not more than 3 copies only of recent testimonials.

Timaru, New Zealand. H. G. NAYLOR, Secretary.

The following staff is required by the GOVERNMENT of IRAQ for the Royal College of Medicine, the Royal Hospital at Baghdad, and the larger Institutes and Hospitals in the Provinces: PROFESSORS of Clinical Surgery; Diseases of the Ear, Nose, and Throat; Surgery; Obstetrics and Gynæcology; Chemical Pathology; Pathology; Clinical Ophthalmology; ASSOCIATE PROFESSOR of Medicine; SURGICAL SPECIALISTS (for the Provinces); DIRECTOR of the Parasitological Laboratory; SPECIALIST in Children's Diseases. Appointment will be for 3 years in the first instance, but a contract for a shorter period may be considered. Salary Iraq Dinars 150 a month, plus high cost-of-living allowance at present I.D. 24 a month (I.D. 1 = £1.) Free first-class passages and liberal leave on full salary. The posts are not pensionable, but there is a Provident Fund. Candidates for professorial appointments should be specialists and have had previous teaching experience. Practitioners now serving in H.M. Forces may apply.

Write, stating age and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/S.A. 922/5.

Doctors, Male and Female, required for Locums and Assistantships. Vacancies for Hospital Locums and Ships' Surgeons. Practices and Partnerships for disposal.—Write: A. SHAW, **Medical Transfer Agent**, Premier Buildings, 88, Church-street, Liverpool.

Wanted, Partner, Riverside Practice. One-fifth Share in old-established Panel and Private Practice. Receipts average £8000. Easy terms of payment arranged.—Address, No. 825, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Secretary-Receptionist to Doctor or Specialist, London. Typing, shorthand, accounts, drive car. References exchanged.—CLARKE, 26, York Mansions, S.W.11.

Secretary, free now, requires post with Doctor, London. Previous long experience with specialist and West End practitioner.—Address, No. 826, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Birmingham Suburban Practice with House for Sale. Pleasant garden. Receipts last year almost £6000, panel 2000. Premium 1½ years' purchase.—Address, No. 827, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Death Vacancy, Manchester District, 1 year's purchase. Over 2200 panel patients. Price required £1700. House to rent.—Address No. 829, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Nursing-homes for Sale suitable for Practitioners: Devon, £3000; I.o.W., £7000; Surrey, £9000; Sussex, £10,500, £12,500 (coast); Suffolk, £14,000; N. Wales coast, £15,000; Kent, £18,000. Substantial mortgages arranged where desired.—Further details from: NATIONAL ASSOCIATION OF NURSING HOMES (business section), 15, Castle-street, Exeter.

Country Town (Devon). Small Practice for Sale—urgent due to illness of present practitioner. No house but accommodation for young unmarried practitioner—only nominal purchase price required.—SONGHURST & RICKARD, 15, Castle-street, Exeter.

Practice for Sale, Northern woollen town, 1 year's purchase. Aver-age income approximately £1400 p.a. House to rent.—Full details on application to: THE NATIONAL MEDICAL AGENCY, 63, Great George-street, Leeds, 1. Phone: Leeds 32486.

Wanted by ex-R.A.F. Medical Officer, unfurnished Flat or small House, rent or buy. Chelsea or Kensington.—Address, No. 823, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Harley-street House will be available shortly. Rooms to Let on lease to members of medical profession for consulting-rooms. Rents average from £3 to £4 per week.—Apply by letter to: SHELLEY, 52, Portland-place, W.1.

Close Harley-street. Doctor's House, 6-7 bedrooms, 3 bathrooms, 4-5 reception. 18 years £325 p.a. £4500.—BRITTON, POOLE & BROWN, 2, Wellington-road, N.W.8.

Wanted, Motor-car, 1939 or earlier. Small mileage. State price.—Address, No. 828, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Wanted urgently, "Diseases of Ear, Nose and Throat," by StClair Thomson and Negus, published 1937.—Address, No. 824, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

If you wish to Buy a Practice in these changing days, or to arrange finance for buying, write for free advice.—Address, No. 830, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Radium: You can hire up to 100 mgms. of radium element made up to any required specification, for the moderate fee of £5 5s. from: J.C. GILBERT, LTD., Columbia House, Aldwych, W.C.2. Tel.: Chancery 6060.

Microscopes Wanted for important work. Send particulars with price required.—WALLACE HEATON LTD., 127, New Bond-street, London, W.1.

Medical Photographs and Drawings for illustrations, records, &c. —Write for particulars: E. O. SONNTAG, 159, Bickenhall Mansions, Baker-street, W.1. WELbeck 8860.

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